

HETEROPTERA

OF

Eastern North America

W. S. BLATCHLEY



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HETEROPTERA OR TRUE BUGS

OF

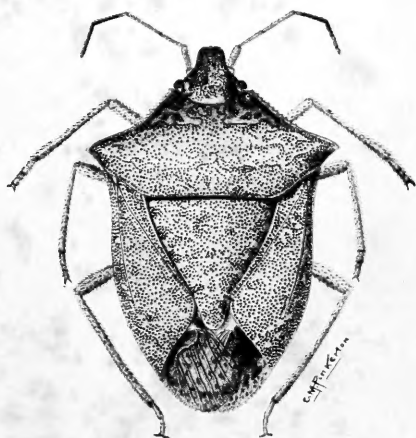
EASTERN NORTH AMERICA

WITH ESPECIAL REFERENCE TO THE FAUNAS
OF INDIANA AND FLORIDA

By

W. S. BLATCHLEY

Author of "Gleanings from Nature," "Coleoptera of Indiana,"
"Boulder Reveries," "Indiana Weed Book," "Orthoptera
of Northeastern America," etc., etc.



"Although I am an insect very small,
Yet with great virtue am endow'd withall."

—Theatr. Ins.

1926

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"To fill the vacant mind with 'wondrous things,'
Dame Nature works in fields and floods and air."

—*Howitt's Martyr.*

"Shame not to drink three Wall-lice mixt with wine,
And garlick bruised together at noon-day,
Moreover a bruised Wall-louse with an egg, repine
Not for to take, 'tis loathsome, yet full good I say.¹"

—*Quintus Serenus.*

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"Nature hath nothing made so base, but can
Read some instruction to the wisest man."

—*Aleyn.*

"Some men prescribe seven Wall-lice² for to drink
Mingled with water, and one cup they think
Is better than with drowsy death to sink."³

—*Theatr. Ins.* 1634.

¹Remedy for tertian agues.

²Bedbugs.

³Remedy for lethargy.

INTRODUCTION.

This is the fourth and last of my manuals or treatises on certain groups of the insects of Eastern North America.⁴ These works were conceived of necessity and brought forth with great labor. However, they have or will perhaps justify their existence in two ways, first by giving needed employment for the brain of a human who by virtue of inherited tendencies has too strong a predilection for work; second, by furnishing beginners in one volume a means of identifying and classifying their specimens taken afield.

Forty and more years ago I began the collecting of beetles, bugs, grasshoppers and their near kin, in the fields and woods of Indiana. For a quarter of a century the work was continued in that State whenever opportunity offered and at all seasons of the year. In 1911 I began to pass my winters in southern Florida, there to collect, between the months of October and May, insects of the same orders. At the very beginning of my collecting, the classification and naming of my specimens became a serious problem. Their original descriptions were scattered through hundreds of pamphlets, periodicals and books, many of which had been out of print for scores of years. Entomological libraries were, and are still, very scarce in the middle west, and specialists in the respective orders were few and too busy to give much attention to the needs of a beginner. Therefore of necessity I began also the collecting of entomological literature, and to prepare for my own use tables or keys of certain groups. The needs of the tyro, based on my own experience, were ever before me, and led to the belief that my tables and accession notes would be of some value, hence the preparation of my "Orthoptera of Indiana" in 1903, and "Coleoptera of Indiana" in 1910. Having broadened my collecting field to include Florida, I also broadened the area covered by my last three works to include the United States east of the Mississippi River and Canada east of the 90th Meridian. Many of the species of Heteroptera herein treated have a much wider range, but I have included

⁴The other three are "The Coleoptera of Indiana," issued in 1910; "Rhynchophora or Weevils of Northeastern America," prepared by Chas. W. Leng and myself and issued in 1916, and the "Orthoptera of Northeastern America," issued in 1920.

only those which have a fairly reliable record of occurrence in the territory mentioned.

As my personal collecting has been done mainly in the States of Indiana and Florida I have, throughout this work, given especial attention to the local distribution of the species occurring in those two states. Since the days of Thomas Say very little has been written on the Heteroptera of Indiana; in fact nothing but a few published notes by myself (1895; 1896) and the casual mention of a few records by Van Duzee and others. Say (1831) published at New Harmony, Ind., a notable paper entitled "Descriptions of New Species of Heteropterous Hemiptera of North America," only a few copies of which are now extant.⁵ In this paper he described as new 135 species; 40 of these he mentioned specifically from Indiana and 14 from Florida. The others he mainly noted as "Inhabits United States," which, I take it, would denote that they were of general distribution throughout this country; or "Inhabits Missouri," which, in 1831, comprised not only the territory of the present State of Missouri, but that of the states northwest of it between the Mississippi River and the Rocky Mountains. A number of other species were described by Say in various scattered papers. As his types were destroyed by fire, a few of his species are at present unknown, others have been proven to be synonyms, but the great majority of them are valid and comprise some of our best known and widely distributed forms.

The distribution of Heteroptera in Florida is much better known than that in Indiana. Mrs. A. T. Slosson, W. T. Davis, Van Duzee, Drake, Hubbell and others have collected them in many parts of the State. Van Duzee (1909) published a paper on the results of his collecting, in which he listed with full notes 168 species, 8 of which he described as new. H. G. Barber (1914) compiled and published an annotated list of all Hemiptera recorded or known from the State up to that time. This included 372 species of Heteroptera, 8 of which were new. Aside from my own collecting, it is from the records of Van Duzee and Barber in the papers mentioned, that most of my distributional notes on the Florida species were derived.

The literature pertaining to the Heteroptera of this country is more scattered and difficult to obtain than that of either

⁵This paper was afterward reprinted by Dr. Asa Fitch (1857) and also by Leconte (1859) and the second reference after each of Say's species in this work is to the Leconte edition, which is the one at present most available to students.

the Coleoptera or Orthoptera. Many of our species have been described by Stal, Reuter, Signoret, Horvath, Bergroth and other European authors in foreign periodicals. Up to 1910 about the only Americans who had studied and described the species of this country were Say, Uhler, Van Duzee and Heide-mann. Since that date a flood of literature by specialists in certain groups has appeared. However the only work covering all the known species of a certain area of this country is the "Hemiptera of Connecticut," issued under the supervision of Dr. W. E. Britton in 1923, and which I have found of much aid.

As in my former works, this manual has been prepared mainly for the use of the tyro and not for the specialist who has a large library at his command. For that reason it has been couched mainly in simple and easily understood language. Characterizations of all families and of most genera are given in some detail, with keys leading up to their treatment. Keys to and full descriptions of all species are then given in proper sequence. These keys are based on the more salient and important structural or color characters separating the groups or species to which they pertain, the primary object being to give to the student a work by which he can readily obtain the scientific name of the specimen in hand. In most instances, to avoid repetition and save space, the characters mentioned in the keys are not repeated in the descriptions which follow, and the keys should, therefore, *always be used in connection with the descriptions*. Moreover, the characters used and statements made both in keys and descriptions are for the most part to be considered as applying only to those species occurring in the territory covered by this work. They may be, and doubtless are, capable of much wider application, but it is not safe to assume that such is the case.

Following the description of each species are notes on its local habitat, general distribution, food habits, etc. These notes are based not only upon my field accession notes, more than 4,000 in number on the Heteroptera, but also on the data accompanying specimens which have been loaned me for study and on the published local lists and other works cited in the Bibliography near the end of the volume. The synonymy of numerous species is, however, so much confused that the general range, as given, especially where it extends beyond the territory covered, is to be considered as open to correction. The

dates of occurrence as given in the notes are usually the earliest and latest at which the species has been noted in the locality cited, and therefore show only approximately the actual time of the appearance or disappearance of the imago or mature insect.

The great majority of the species of Heteroptera treated in this work are represented in my personal collection and, unless otherwise stated, all types of new species described by me are contained therein. When not so represented I have been able to borrow examples of many named specimens from other collectors, so that, as far as possible, I was able to study, in connection with the original description, undoubted correctly named specimens and draw up new descriptions from them. Thus, of the first 600 species treated, I had in hand in preparing the descriptions examples of all but twenty. In the families Miridae and Corixidae, I was, however, unable to secure specimens of a number of the species for examination and the descriptions of these, as given, were therefore of necessity compiled from those extant.⁶ The source of the specimens in hand as I prepared the descriptions is usually given in the notes. Where not so given they were collected by myself. Thus "Raleigh, N. Car. (*Brimley*)" indicates that the specimens were taken at Raleigh and loaned or presented to me by C. S. Brimley of that place; while "Marco, Fla., March 4 (*W. S. B.*)" signifies that the specimens were taken by me at Marco on that date. The native and established species are numbered consecutively throughout the work, while the few species included as adventives or whose present status is doubtful are not numbered. The number in parenthesis following the serial number is that of Van Duzee's "Catalogue of the Hemiptera of America North of Mexico," a comprehensive reference work which has been of great use to me.

CLASSIFICATION.—The classification and sequence followed in this work represent my own opinions and not those of any previous author. There has been too much of a tendency by the writers of this country to follow strictly the con-

⁶Of the 27 individuals from whom I asked the loan of specimens for study, 23 cordially granted me the favor, and stated that they were pleased to do so. Of the remaining four, two wholly ignored both of the letters which I sent each of them. A third was "too busy with his classes to spare the time to send me any specimens of Tingitidae," while the fourth wrote: "I might loan you large numbers of Miridae, but I will have to be satisfied that you are giving me first opportunity to work over and describe any possible new forms in your collection. I cannot afford to loan you specimens from my collection and have you turn and use them as a basis to recognize new forms; not until I at least have had that opportunity. No doubt you would like to do in ten months what it has taken me ten years to work out, but the only way for you to travel that fast is to compile the literature."

clusions of Stal, Kirkaldy, Reuter and other European authors. They, for the most part, were "closet naturalists," who studied insects in museums or those which had been sent to them by other parties, and which they had never seen in the field. They therefore knew nothing of the local environments which brought about minor changes in structure or color. Bueno (1909, 402) has well said: "While we should respect the work of our predecessors, the pioneers in a sterile field, I fail to see the necessity of following in their footsteps, stepping cautiously into each footprint like Indians on the warpath."

I have raised to family or subfamily rank a number of groups formerly regarded as subfamilies or tribes, as the differences separating them from their allies are greater than those separating similar divisions among the Coleoptera and other orders of insects. Where the names I have used for the higher groups differ materially from those used by present day specialists, their names are given in parenthesis or are referred to in footnotes, and the student can use them if he so desires.

As with the higher groups so with the genera. I have not always adopted the generic names which have been proposed in recent years for certain of our species. A genus should be based on certain definite and fixed structures and once so founded all species then or thereafter assigned to that genus should possess those structures. Strictly speaking, a genus does not exist in nature but is only an artificial concept proposed by man to enable him the more readily to group his species. As to what really constitutes a set of generic characters there are about as many individual opinions as there are proposed or adopted genera. My reasons for rejecting or adopting certain questionable genera are usually set forth and the student can use his own judgment as to whether they are sound or not.

The subgenera and other minor groups of certain authors are not generally recognized in this work. In their place and solely to shorten and simplify the keys I have sometimes used "groups," usually without definite names, as they lead up more easily and with less confusion to the main object sought—the scientific name of the specimen in hand.

Throughout the work I have used trinomials to designate races, varieties, variants, subspecies, incipient species and sometimes even color varieties, usually noting which of these

minor forms I consider the third name to represent. The name of the typical variety, if more than one exists, is not printed as a trinomial. I thus use *Eustictus tristigmus* (Say), not *Eustictus tristigmus tristigmus* (Say). In many cases I have not recognized the so-called geographical races or color varieties of recent authors. Where a well known species ranges over a large area, the different environments due to altitude, variation in mean annual temperature, atmospheric conditions, difference in topography, drainage and soils, varied food plants and many other causes, are sure to bring about certain changes in its color or external structure. If only the extremes of these variants be at hand they are often so different in appearance as to cause them to be considered races or even different species. However, where a large series from all parts of the range are present, intermediates are almost sure to be found and there is little use and often much resulting confusion in giving or recognizing a name for each slightly variable form. A geographical race, or even a species may be wholly based on color characters alone, provided those characters are fairly constant, as in the fixed color of an antennal joint or the presence of a cross-bar on pronotum or elytra, but to name numerous color varieties based upon the variation of the amount of fuscous or red of the pronotum or elytra, as has been done in *Paracalocoris* and other genera, is nonsense. One might as well give to each spotted dog a varietal scientific name.⁷

BIBLIOGRAPHY.—The bibliography near the end of this volume is not a complete list of the works pertaining to the Heteroptera of Eastern North America, but contains only the names of those works to which especial reference has been made in the text, and a few additional ones which it was thought might at times be of use to the student of our fauna. In the bibliography the list of papers is arranged alphabetically by authors and each author's works chronologically by years. Where more than one paper by the same author appeared in any one year the letters *a*, *b*, *c*, etc., follow the year. Thus a citation in the text to Van Duzee (1916b, 100) will be found, by reference to the bibliography, to refer to page 100 of his paper entitled "Monograph of the North American Species of *Orthotylus*," published in the Proceedings of the California Academy of Sciences, Vol. VI, No. 5, pp. 87-128. After the name of each family, subfamily, genus and species

⁷See Journ. N. Y. Entom. Soc., XXXII, 1924, p. 150.

as recognized in this work, is given the name of its author or founder with year and page number of the work where the family or genus was founded or the species described and named. Thus *Orthotylus catulus* Van Duzee, 1916b, 106, refers to the original description of that species on page 106 of the paper above mentioned; while KOLENETRUS Barber, 1918c, 49, means, as a reference to the bibliography will show, that the genus *Kolenetrus* was founded by H. G. Barber, on page 49 of his paper entitled "Concerning Lygaeidae—No. 2," which appeared in the Journal of the New York Entomological Society, Vol. XXVI, 1918, pp. 49-66. For the most part the names of the authors cited are spelled out, but that of J. R. de la Torre-Bueno has been shortened to Bueno.⁸ No attempt has been made to cite all the references to each species in the literature pertaining to the Heteroptera of the region covered, as such mention or synonymy would fill several volumes by itself. The student is referred to the Van Duzee Catalogue above cited for detailed reference to each species up to the year 1917, and to the "Bibliography of the North American Hemiptera-Heteroptera" by H. M. Parshley for the full titles and place of publication of the great majority of the papers pertaining to the Heteroptera of this country up to June, 1925.

MEASUREMENTS.—The measurements used in this work are given in millimeters or decimals thereof. A millimeter (mm.) = .0394, or a little more than 1/25 of an inch. For all practical purposes it may be remembered that 2.5 mm. = 1/10 inch; 3 mm. = 1/8 + inch; 4 mm. = 1/6 + inch; 5 mm. = 1/5 inch; 7.5 mm. = 3/10 inch; 10 mm. = 2/5 inch; 12.5 mm. = 1/2 inch; 15 mm. = 3/5 inch; 17.5 mm. = 7/10 inch; 20 mm. = 4/5 inch.

The measurements as given are usually those of the extremes of the series at hand and thus represent fairly well the variation in size of the different parts measured. The length of the body in macropterous forms is taken from the tip of the tylus to the apex of the membrane of elytra, and in the brachypterous ones to the apex of abdomen.

Where, in the original description, the specific name was placed by the author in a genus different from that to which it is now referred, the name of the author or its abbreviation is placed in parenthesis.

ILLUSTRATIONS.—The illustrations used in this work have been derived from various sources, and credit is given under

⁸Royal Palm Park in extreme southern Florida, where I have collected extensively, is, in the distribution notes, also abbreviated to "R. P. Park."

each to its author or the one who first used it. The drawings for those marked "original" were made by Miss Mary C. Foley, artist for the Bureau of Entomology at Washington, D. C. Through the kindness of Dr. W. E. Britton, State Entomologist of Connecticut, I was able to borrow a number of the cuts prepared for the "Hemiptera of Connecticut," recently published by the Connecticut Geological and Natural History Survey. Under each of these credit is given its author and that work.

Dr. Wm. A. Riley and Prof. A. G. Ruggles, of the University of Minnesota, kindly loaned me such of the cuts as I desired which were used by Otto Lugger, former State Entomologist of Minnesota, and they are credited to Lugger or their original author. From Dr. M. W. Blackman, Chief of the Department of Forest Entomology at the New York State College of Forestry, Syracuse, N. Y., I was able to secure a number of the cuts of Heteroptera used in Technical Bulletin No. 16, published by that Department, and credit under each of these is given that work. Mr. Harry B. Weiss, of the State Department of Agriculture, Trenton, N. J., kindly furnished a number of the cuts of Tingids used by Barber and Weiss in their "Lace Bugs of New Jersey." Dr. S. A. Forbes and Mr. T. H. Frison, of Urbana, Ill., furnished numerous cuts used in the publications of the Illinois State Natural History Survey, and Dr. W. J. Holland some from the Annals of the Carnegie Museum. In addition to the above a number of illustrations in previously published papers on Heteroptera have been reproduced and due credit is given the author under each.

ACKNOWLEDGMENTS.—When I first began to form my private collection of Heteroptera on which this work is mainly based, Prof. P. R. Uhler, of Baltimore, Md., was the leading authority in this country on the group. He bore, in fact, to our knowledge of American Heteroptera the same relation that Leconte and Horn did to that of Coleoptera and S. H. Scudder to Orthoptera. In other words he was the pioneer who laid the foundation of our present knowledge of American Heteroptera. To Uhler I sent many of the first species I collected for naming and from him I received without delay the lists of names with comments on those species which were to him of especial interest. A few of his determinations have since proved to be wrong, and to a number he gave "Uhler,

Ms." as the author, some of which he never described. But to him and his published works I owe much of my early knowledge of the classification of the group.

Mr. E. P. Van Duzee, then of Buffalo, N. Y., now Curator of Entomology in the Museum of the California Academy of Sciences, is a leading American authority on Heteroptera who identified many species for me in former years and who has determined others and loaned me numerous specimens during my preparation of this work.

To Prof. H. G. Barber, of Roselle, N. J., the leading authority on American Lygaeidae, I am indebted for many favors, not only in the identification and loaning of specimens, but in the solving of numerous knotty problems of synonymy and nomenclature.

As in my works on Coleoptera and Orthoptera, so in this, my friend and fellow naturalist, W. T. Davis, of Staten Island, N. Y., has been of great service. Anything I wanted which he could furnish in the way of specimens or literature he gladly sent, and he also furnished many notes on distribution and habits.

The work in its present form would not have been possible had it not been for Wm. J. Gerhard, of the Field Museum of Natural History at Chicago. He possesses one of the best private collections of Heteroptera in this country, which was placed at my command, and also an excellent library of the literature of the group from which he loaned me many scarce papers by foreign authors which I could not secure elsewhere.

C. S. Brimley, Entomologist of the North Carolina State Department of Agriculture, who is much interested in Heteroptera, placed at my disposal their entire collection, and sent me many specimens from that section of the country which I otherwise might not have seen.

Prof. J. J. Davis, Chief of the Department of Entomology at the Purdue Agricultural Experiment Station, secured for me much literature and furnished numerous specimens from the Station collection.

Mr. W. E. China, Curator of Hemiptera in the British Museum at London, England, sent me numerous specimens from the collection in that Institution, and compared others for me with the rare types therein.

Others who aided either by the loan or identification of specimens, or both, were Dr. Herbert Osborn, Columbus, Ohio,

one of the American authorities on Hemiptera; Nathan Banks, Curator of Insects in the Museum of Comparative Zoology, Cambridge, Mass.; J. R. de la Torre Bueno, of White Plains, N. Y., an authority on aquatic Heteroptera; Dr. Wm. L. McAtee, Curator of Hemiptera in the U. S. National Museum; Drs. Carl J. Drake and H. H. Knight, of the Department of Entomology, Iowa State College, specialists respectively in Tingididae and Miridae; Dr. S. B. Fracker, State Entomologist, Madison, Wis.; Harry B. Weiss, widely known Entomologist of Trenton, N. J.; Dr. H. B. Hungerford, State Entomologist and student of aquatic Heteroptera, Lawrence, Kan.; Dr. A. J. Mutchler and C. E. Olsen, Curators of Insects in the American Museum of Natural History, New York City; Prof. C. R. Crosby, Entomologist, Cornell University, Ithaca, N. Y.; Prof. R. F. Hussey, Washington Square College, New York City; Prof. T. R. Frison, Curator of Insects, State Natural History Survey, Urbana, Ill.; Prof. C. E. Mickel, Curator of Insects, University of Minnesota, St. Paul, Minn., and C. A. Frost, Entomologist, Framingham, Mass.

To one and all of those mentioned and to numerous others in a minor degree my thanks are due, and are herewith gratefully given for the favors shown.

RELATION OF THE HETEROPTERA TO OTHER ANIMALS.

If we compare the body of a true bug or other insect with that of any vertebrate animal, as a fish, bird or squirrel, we find at once great and important differences. The vertebrate is an animal with an inner bony skeleton, two pairs of jointed limbs or appendages, and breathes by means of lungs or gills, according as it dwells in air or water. The bug is an animal which has no inner skeleton or bones whatever, but only a hard crust on the surface which surrounds the muscles and vital organs. This crust is composed of separate rings, placed end to end.

Animals whose bodies are thus composed of rings are called *Articulata*. They are in turn divided into two great groups, the *Vermes* and the *Arthropoda*. The *Vermes* (worms) have all the rings composing the body very nearly alike, not hardened into an outer crust or exoskeleton, and without paired limbs which are jointed. The *Arthropods* have a part of the rings bearing paired jointed appendages, and have the cuticle or outer surface consisting largely of a peculiar substance called "chitin,"

which is secreted or exuded by the cells which compose the cuticle. Chitin itself is insoluble and is not composed of cells, but consists of fine, irregular plates. It hardens the cuticle and thus aids the latter in protecting delicate vital organs within, and also in forming a framework to which the muscles of movement may be attached. Between the joints the cuticle is devoid of chitin and is thin, delicate and flexible, thus allowing the necessary freedom of motion.

The Arthropoda are divided into four classes, as follows:

(a) *Crustacea* (crayfish, lobster, etc.), mostly aquatic; having the head and thorax usually united and distinct from the abdomen; breathing by means of gills or directly through the skin, the exoskeleton with carbonate and phosphate of lime in addition to chitin.

(b) *Arachnida* (spiders, mites, etc.), terrestrial; head and thorax usually combined, and bearing four pairs of legs; breathing by means of tracheæ.

(c) *Myriapoda* (myriapods, centipedes, etc.), terrestrial; usually worm-like, with only the head distinct; legs numerous; breathing by means of tracheæ.

(d) *Insecta* (grasshoppers, flies, beetles, bugs, etc.), in great part terrestrial; legs six; adults usually with one or two pairs of wings; breathing by a system of tubes called tracheæ, which branch and ramify through every portion of the body, and which open externally in about ten places on each side of the body instead of at the front end. The rings of the body are grouped in three regions; the *head*, the *thorax* and the *abdomen*. In general it may be said that the head contains or bears the organs of sense and of prehension and mastication of food; the thorax the organs of locomotion, and the abdomen those of reproduction.

THE EXTERNAL STRUCTURE OF A TRUE BUG.

Having thus shown that a bug belongs to the class *Insecta* it is thought best, before giving its relation to the other orders of that class, to describe briefly the external parts of a typical specimen. The beginner may thus the more readily grasp the name and location of the parts used in classification, as well as the meaning of many of the technical terms which, of necessity, have to be used in such a work as this. These parts are well set forth by Dr. H. H. Knight in the accompanying figure from the "Hemiptera of Connecticut," though all the parts

shown in the figure are not present in the species of many families of Heteroptera. The three regions of the body, the head, the thorax and the abdomen with their appendages, will

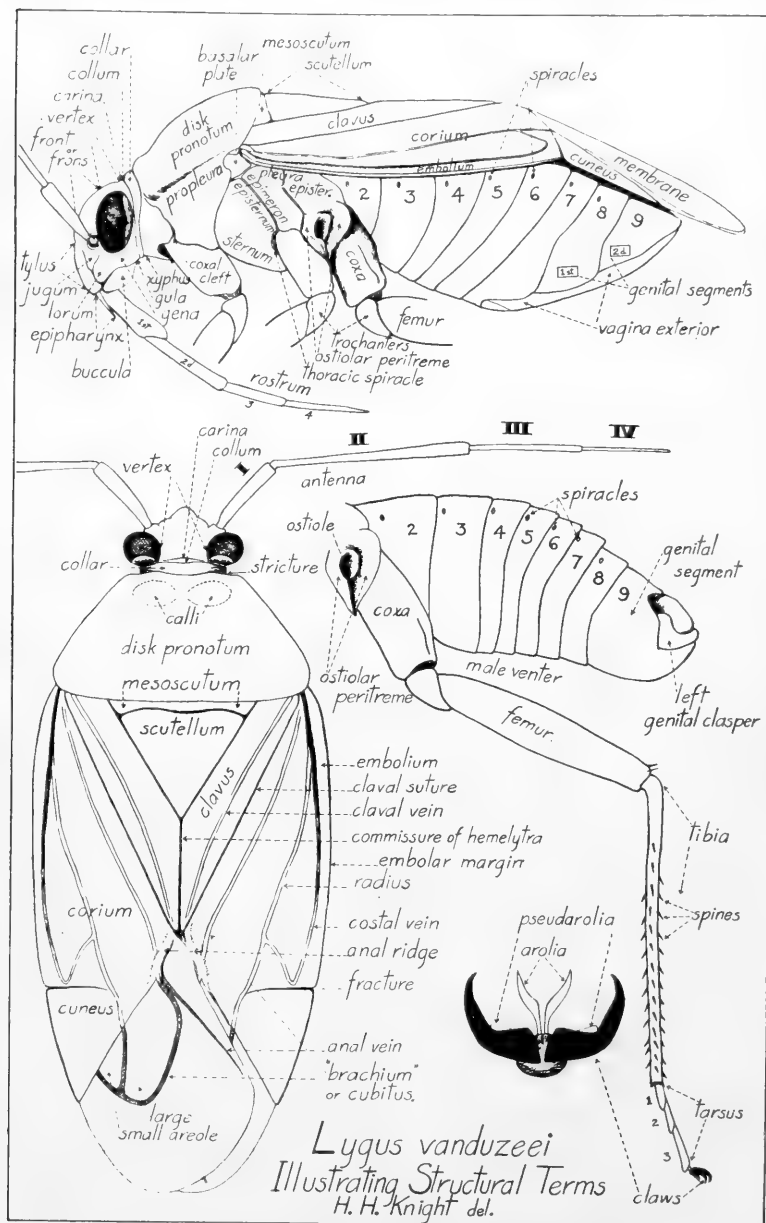


FIG. 1. ILLUSTRATING THE EXTERNAL PARTS OF A BUG.
 (After Knight, in Hemiptera of Connecticut).

therefore be considered in order and as represented in the figure.

THE HEAD.—The heads of Heteroptera vary much in form and size and are composed of four or more segments or rings, solidly fused together to form a single cavity or hard box of chitin, known as the *epicranium*. This contains the brain and accessory ganglia, and the mouth cavity. It bears or gives support to the antennae, mouth parts, eyes and ocelli; also internally to the muscles moving the rostrum or beak. The broad basal portion of the epicranium back of the eyes is known as the *occiput*, the narrower portion between the eyes, the *vertex*, while the long, often more or less deflexed frontal portion is the *front* or face. Below the front and between it and the base of beak there are usually three more or less distinct parts, separated by sutures or grooves. The median one of these is the *tylus*, sometimes called the *clypeus*. The parts adjoining this on either side are known as the *jugae* or upper cheeks. On the outer sides of the jugae and in front of the eyes are the *lorae*, these however being often indistinct or even wanting. Below the eyes and between the lorae and gula or throat are the *genae* or lower cheeks. The lower side of the head is composed of the *gula* or throat, lying above the base of the beak when the latter is in repose. On the front of the gula and each side of the base of beak are usually two plates known as the *bucculae*.

On the upper sides of the head are the two *compound eyes*. They vary much in shape, size and convexity and are often larger in the males than the females of the same species. Each is made up of many hundreds of six-sided facets or lenses, in each of which ends a single filament of the optic nerve. Two small simple eyes or *ocelli* are present in most Heteroptera, but are absent in the largest family, the Miridae, and hence are not shown in figure 1. They are usually situated on the vertex between the basal halves of the compound eyes. These ocelli are thought to be inherited from the obscure eyes of the worm-like ancestry of the bug, while the many faceted compound eyes of insects and crustaceans have been evolved to satisfy the needs of the more recent existence of these groups.

The *rostrum*, or *beak* as it is called in this work, is to the bug the most necessary external appendage of the head. It is attached to the lower front part of the head, close to the tip of the tylus and when not in use is carried flat, usually in a groove,

along the lower part of the body and between the coxae. It consists of two parts (fig. 2), a sheath or tube-like outer part of horn-like chitinous texture and an inner sucking organ proper composed of four very slender hair-like setae which are somewhat dilated at the base. The sheath consists of an elongated grooved *labium* or lower portion which is divided into

segments or joints of variable length and one to four in number, and a short upper flexible portion covering the base of the setae and corresponding to the *labrum* of other insects. The sheath serves as a wrap or protection for the delicate setae, and also, in some of the predaceous Heteroptera, as a piercing or defensive organ. The setae are fine flexible rods which can be fitted closely together to form a tube. They vary in length, sometimes being much longer than the sheath and are capable of protrusion. Their tips are very sharp and for the most part

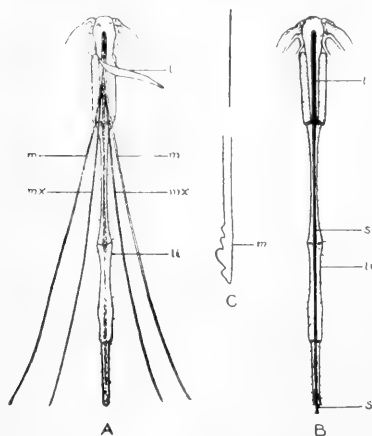


Fig. 2. Beak of *Nezara viridula* (L.). A, dorsal view with setae pulled out from sheath; B, same with setae in normal position within sheath; l, labrum; li, labium; m, mandible; mx, maxillae; s, setae within sheath, their tips protruding; C, tip of mandible greatly enlarged, showing barbed tip. (After Drake).

make almost invisible pricks in the epidermis of leaf or larvae of insects. Usually they alone are used in piercing the object used as food. The outer pair are generally barbed near the tips and when inserted in a victim readily maintain their hold. Sometimes the struggles of the prey pull the setae out of and to one side of the sheath. The bug then releases its hold and draws the beak between the front tarsi, in the same manner that an ant cleans its antennae, thus forcing the setae back within the sheath. The relative length of the beak and of its segments are much used in the classification of the Heteroptera.

The antennae of a bug are usually inserted in shallow cavities on the front or sides of the head and articulate with the latter by a ball and socket joint. In the aquatic forms they are shorter than the head and are generally concealed in small pockets or cavities on the under side of the head. They are usually composed of only four or five segments which vary

much in relative length and thickness and this variation is extensively used in classification.

THE THORAX AND ITS APPENDAGES.—The middle region of the body of a bug or other insect is called the *thorax*. To study its parts aright, the wings and legs attached to it should be removed, when it will be seen to consist of three rings or segments. These are known as the *prothorax*, *mesothorax* and *metathorax*. Within these rings are located the muscles for moving the wings and legs, as well as some of the digestive organs.

The prothorax of the bug usually has its entire dorsal surface, and sides in great part, covered by a large piece known as the *pronotum*. This varies much in shape and size in the different families of Heteroptera. Its upper surface is called the *disk*, and its deflexed sides or flanks the *propleura*. The outer edges separating the propleura from the disk are the *lateral margins*. These are sometimes carinate or raised and sharp and are often sinuate, toothed or crenate. The disk is often divided crosswise by a groove or impressed line, thus forming two divisions or lobes. The front one of these sometimes has a second impressed line or *stricture* just behind its apex, the area in front of this being known as the *collar*. On the upper surface of the front lobe, or front portion of the disk, are often two slightly elevated, usually smooth areas known as *callosities* or *calli*. The angles where the lateral margins of the disk meet the hind margin of the pronotum are known as the *lateral* or *humeral angles*, but are sometimes called the *humeri*. The under or ventral side of the prothorax is a narrow, somewhat movable piece called the *prosternum*. Near its outer ends are shallow sockets in which are attached the coxæ of the front pair of legs. Between the bases of these coxæ is a triangular piece known as the *prosternal xyphus*.

The *mesothorax* and *metathorax*, the second and third segments of the thorax, are, in the bug, rather firmly united with the basal abdominal segment of the abdomen to form a firm walled box. Lying immediately above the mesothorax is the *meso-scutum*. This is usually covered by the hind lobe of pronotum and base of outer wings, though sometimes it is partly exposed as in figure 1. To the mesothorax are attached the elytra, or outer pair of wings and the second or middle pair of legs. To the metathorax are joined the inner wings and the third or hind pair of legs. The under or ventral portion of these seg-

ments are called respectively the *mesosternum* and *metasternum*, and their side pieces the *meso-* and *metapleura*.

In most of the plant-feeding Heteroptera there is present each side on the inner end of the metapleuron and near the hind coxa a small opening known as the *osteole* (or *ostiole*). It is usually borne upon a somewhat elevated and delimited area of the metapleuron known as the *osteolar peritreme*. This osteole is the external orifice of the stink gland, and through it is emitted at the will of the bug a liquid or vapor which gives off the characteristic odor of the insect. The visible portion of the osteole varies greatly in form. Sometimes the rim of the opening is expanded to form an auricle or is prolonged outwardly as an open canal-like duct. Again, the opening may be at the end of a closed tube which extends outwardly on the peritreme for some distance from the coxa. These variations are used extensively in the classification of the Scutelleridae, Anthocoridae and other families.

Behind the pronotum and lying above the meso- and meta-thorax and between the bases of the outer wings is the *scutellum* or shield. This, in the Heteroptera, is usually much larger and better developed than in other insects, sometimes covering almost the entire abdomen and outer wings. It is usually more or less triangular in shape and, in certain families, its side margins are furnished with a ridge or fold known as the *frenum* on which in repose the inner edge of the clavus rests. The shape, size and sculpture of the scutellum are much used in classification.

The outer or front wings of the Heteroptera are known as *hemelytra* (or in this work as *elytra*). They differ greatly in texture and form from the inner ones and this, taken in connection with their peculiar structure, gives name to the order, the word Heteroptera meaning "diverse-winged." They close above and in great part or wholly cover the abdomen, the basal portion being more or less horny in texture, the apical one usually membranous and overlapping. The thicker basal portion of the elytron is divided into two parts, the *corium* or larger outer portion and the *clavus* or narrow part lying next to the scutellum and separated from the corium by the *clavai suture*. In the Miridae and allied families (fig. 1) the outer or costal part of the corium is usually sharply delimited by a suture and is called the *embolium*, while the apical triangular portion of the corium is separated by the *fracture* and is known as the

cuneus. Where the two clavi (plural of *clavus*) meet behind the apex of scutellum their suture or line of union is known as the *commis sure*. The *membrane*, or apical membranous portion of the elytron, is usually veined, and in certain families, as the Miridae, the veins unite to form one or more closed cells or *arcoles*. The elytra in some of the individuals of many species of Heteroptera are often abbreviated. These are termed *brachypterous* forms and in them the membrane, and sometimes the clavus, is often absent or much shortened.

The inner or hind wings of a bug are almost wholly membranous and are little used in classification. When at rest they are folded across the apical portion and concealed beneath the elytra.

The legs of a bug are six in number, arranged in pairs, one pair being joined to each of the divisions of the thorax. They are composed of five parts, viz.: the *coxa* or basal segment which in the terrestrial families is united by a ball and socket joint to the thorax; the *trochanter*, a small triangular segment united to the base of femur and apical part of coxa; the *femur*, a long and usually stout segment which is often more or less clavate and toothed or spined beneath; the *tibia*, also long but more slender, and usually with two or more rows of slender spines or setae, and the *tarsus* or foot, which is composed of one to three movable joints, the terminal one usually ending

in a pair of claws. In many species the claws have attached to their bases a pair of slender appendages known as *arolia*, and sometimes an accessory pair of *pseudarolia*. In many species of predaceous bugs the front tarsi and femora are raptorial or armed beneath and otherwise modified to form (fig. 3) grasping or prehensile organs, which are used to

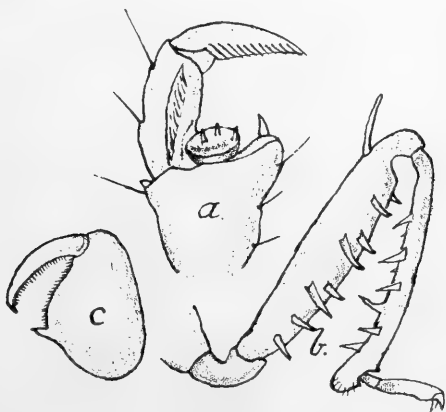


Fig. 3. Prehensile fore legs of bugs. *a*, of a hog-louse; *b*, of a soldier bug, *Podisus*; *c*, of an ambush bug, *Phymata*. (After Lugger).

catch and hold their prey. In the aquatic bugs part or all of the tibiae are often more or less flattened and beset with numerous ciliae for aid in swimming.

THE ABDOMEN.—The abdomen or hind portion of the body of a bug is composed of nine or ten more or less complete segments, so united as to be movable in a small degree. Each segment is composed of two parts, a *tergum* or upper portion, and a *ventral* or under piece. The ventral of the first or basal abdominal segment is united firmly to that of the metathorax. Seven or eight of the ventral segments of the bug have a small opening near the ends or lateral margins. These are *spiracles* or external openings of tubes which serve as air passages. The side margins of the abdomen in the Heteroptera are usually more or less flattened and expanded to form the *connexivum* (see fig. 17), the upper and lower surfaces of the abdomen proper meeting along its inner edge.

The eighth and ninth ventrals of the bug are more or less modified in both sexes. In the female they are known as *genital segments* and in many species each bears a pair of processes so modified as to form an ovipositor. This serves both as a cutting instrument to make slits in the epidermis of plants and also as a tube-like organ to place the eggs therein. In repose the ovipositor is in great part concealed. In the male the last ventral is modified to form a secondary sexual organ, also known as the *genital* segment. It bears a pair of clasping organs, the variations of which are, by some authors, much used in classification.

The above constitute the more important external parts of a true bug, the characters of which are used in determining the name and position of any member of the order Heteroptera. As will be seen in the pages which follow, these different parts vary much in size and in form, but the names given to them apply as well to the members of one family as to another. By referring to the accompanying figures, and by observing carefully the parts of the specimen in hand, the beginner need have little hesitation in deciding as to whether the description agrees with that specimen.

In order to simplify and shorten the keys and descriptions in the main body of this work I have used in a modified form many of the terms above mentioned. I thus use *beak* for rostrum, *checks* for jugae, *elytra* for hemelytra, *joint* for segment, and antennal, dorsal, ventral, connexival, tarsal, etc., for the different segments or divisions of the parts to which they pertain.

THE RELATION OF HETEROPTERA TO OTHER INSECTS

All true insects can be separated into one or the other of two great groups, based upon the kind of changes or transformations which they undergo before reaching the adult or winged stage. To one group, the *Metabola*, belong those insects which undergo what is called a *complete metamorphosis*. In this group there are four distinct stages, the egg, larval, pupal and imago, in the order named.

The second group, the *Heterometabola*, comprises those insects in which the *metamorphosis* is *incomplete*; the young, when hatched from the egg being wholly wingless and of the same general form as the parent. As the insect grows it moults its skin a number of times and wings develop gradually, there being no sharp line defining the larval and pupal stages. The young of all stages are called *nymphs* and continue active and feed from the time of hatching until they reach the final moult and emerge therefrom mature or in the imago stage.

It is to this second group, the *Heterometabola*, whose members undergo an incomplete metamorphosis, that the Heteroptera, the order of which this paper treats, belong. From other orders of the group as the Orthoptera or locusts, Odonata or dragonflies, etc., the Heteroptera may be known by having the wings, when present, four in number, *more or less net veined*, the *outer or front pair more horny than the hind ones, folding flat on the back, their apical portion more membranous than the basal one*; *front of head not touching the coxae*; *mouth parts sucking, consisting of a proboscis or movable beak which, when at rest, is concealed beneath the body*. The members of the order Homoptera possess a somewhat similar beak, and they and the Heteroptera are usually considered as suborders of the order Hemiptera. However in the Homoptera the outer wings cover the abdomen in a roof-like manner and are usually of the same texture throughout; while the front of the head is much inflexed so that in repose it is in contact with the front coxae. These and other differences lead me to treat the Heteroptera as a separate and distinct order.

HABITS OF HETEROPTERA.

FOOD AND MATING HABITS.—The food and mating habits of the Heteroptera are almost as diversified as the species themselves. Uhler (1884, 205) has well said: "They are either **aerial, terrestrial, riparian, or aquatic**. Some pass their lives

in the upper parts of trees, others chiefly on the lower limbs; still others prefer the protection of roots, stones, or rubbish on the ground; a large number of species select a home beneath the surface of the earth, often in the holes of ants or other insects; a conspicuous assemblage of dull-colored forms occurs only in the crevices or under the bark of trees and shrubs; while a host of others skim over the surface of placid waters, and a few are found remote from land upon the rarely disturbed waves of the tropical and sub-tropical oceans."

In this work the general habitat and food habits of each group are briefly treated in the notes under the family or generic heading, and those of the species in the notes following the description. Those species which are plant feeders occur on or near their host plant. Some are to be found on the ground hidden beneath dead leaves and other debris about or between its roots; others on the lower leaves or, if it be a tree or shrub, in the crevices of or beneath the bark; still others higher up on the flowers or leaves of the upper branches. The predaceous species, which feed upon caterpillars and other larvae, are liable to be found anywhere that their prey occurs. while the subaquatic and aquatic forms are usually found only near, within, or upon the surface of water. However, the adults of some aquatic species, especially during the mating season, fly freely to light.

In the keys to families and elsewhere in this work certain terms are used to signify in one word the general or local *habitat* of the group or species, and also the character of its food. Thus, *aquatic* means living in the water; *semiaquatic*, on the surface of water; *subaquatic*, or *hygrophilous*, close to the water, along the margins of ponds, streams, marshes, etc.; *littoral*, living on the sandy or mucky shores of oceans, lakes or streams; *maritime*, on the waters of the ocean; *submaritime*, along its shores; *subterrestrial*, living beneath the ground; *terrestrial*, living on the surface of the ground or on herbs or low shrubs close thereto (sometimes, in a more general sense, the opposite of aquatic); *thamnophilous*, living on shrubs; *arborcal*, on trees. Terms relating to food habits are *phytophagous*, leaf-eating or vegetable feeders; *predaceous* or *predatory*, searching for and feeding upon other forms of insect or lower form of animal life; *parasitic*, living and preying upon man or other animals.

As with the Coleoptera, it will be found that the best collecting grounds are along the sides of lanes, roads and cultivated

fields. Few species occur in dense woodland, and those mainly on the boles of trees, in the moss growing on or about their roots or in bunches of dead leaves which have collected in the forks of their branches. Many species fly to light, especially during the mating season.

In mating the terrestrial bugs mostly pair end to end. However, in the Phymatidae, and perhaps other families, the male mounts the back of the female as in the Coleoptera. Their eggs are deposited on or near the host plant, and after hatching the young moult or change the outer skin four or five times, at intervals of a few days each, to become adults. Growth is thereby permitted, the wing pads and body after each moult become one size larger and aside from size and absence of wings, there is usually but a slight difference to be noted between nymphs of the last two stages and the adults.

DEFENSIVE HABITS.—When approached or disturbed many species of bugs feign death, folding their antennae and legs closely beneath the body and therefore, if above the ground, tumble thereto. Others are very alert, quickly flying when alarmed, while some of the ground frequenting species, as the long-necked *Myodocha scirripes* (Oliv.), when uncovered run swiftly to a new hiding place beneath nearby debris. When handled, or often when captured in the sweep net or beaten into an umbrella, those species with osteola present emit their characteristic defensive odor. In many species this odor is not unpleasant, and that of some has been likened to the smell given off by a ripe pear. In the family Pentatomidae or “stink-bugs” and Coreidae or squash-bugs it is, however, notorious and offensive. Birds, and people too, for that matter, soon learn to avoid the bugs which excrete this odor. Many a boy, while berry hunting in the country, has clapped a number of berries into his mouth, only to experience a smarting sensation and a nauseating taste, brought about by the acidulous liquid from the glands of a stink-bug which accompanied the berries. In this way, if in no other, the boy learned the virtues of the protective principles possessed by the stink-bug tribe and future stink-bugs, if not the one in the mouth, profited as a result. Birds probably learn to avoid the use of stink-bugs as food in much the same manner; though, like many other traits of the lower animals, this knowledge may in them be instinctive rather than acquired.

The beak of many species of bugs is used as a defensive

organ against humans and probably other animals. This is especially true of the larger predaceous species belonging to the families Reduviidae and Naurocoridae. When picked up and handled without care they can and often do pierce the fingers, inflicting a deep wound which is more painful and lasting than that of the sting of a bald hornet. The beak of these larger forms is also often used to kill and hold their prey.

The Heteroptera apparently have few natural enemies among the higher forms of life. Birds as a rule avoid them on account of their offensive odor, but spiders appear to pay little attention to this, as I have taken several rare species from their maws or webs. Like the Orthoptera they are attacked by several kinds of mites, the most common of which is a red species of *Trombidium*. I have found it attached to a number of species of bugs, even to that most slender-bodied form, *Hydrometra martini* Kirk. They are also, during long spells of warm moist weather, often attacked by vegetable fungi.

THE COLLECTING AND PRESERVATION OF HETEROPTERA."

As will be noted in the pages which follow, each species of Heteroptera has its favorite local habitat or chosen haunt, the place where it finds the struggle for existence least fierce, food most abundant, protection or concealment from its enemies most easy. Here the collector will find that species most abundant and for the beginner a few directions for its capture and preservation will perhaps be useful.

INSECT NETS.—The most efficient device for taking the majority of forms of Heteroptera is a strong sweep net. The frame of the folding steel landing net made for fishermen and sold in most sporting-goods houses serves admirably for the frame of a sweep net. When unfolded it should have a diameter of about 16 inches; and the handle should be preferably of one piece and not over 30 inches long. The bag should be made of heavy unbleached muslin and should be 20 to 24 inches in depth. Such a net can be easily used with one hand both in sweeping from side to side herbs and small shrubs as one walks leisurely along, or it can be used more forcibly in quick upward sweeps against the branches of larger shrubs and trees, thus jarring the insects into the net, where they can be captured with fingers or forceps, or by placing the mouth of the killing bottle quickly over them. This net also serves well

"For more detailed directions on this subject see Torre-Bueno (1925).

instead of an umbrella as a beating receptacle. For this purpose it is held under the foliage with one hand while the limb is struck a quick, sharp downward blow with a strong stick. The sweep net serves best in the capture of such Heteroptera as do not fly quickly and which are resting, for the most part invisible until caught, on the foliage of herbs and shrubs. These include most of the terrestrial leaf-eating species. The one disadvantage in the use of the sweep net is that it prevents the host plant from being definitely known, unless, as is seldom the case, the vegetation is of a single species.

For the taking of Cydnidae, Lygaeidae and other ground-frequenting species, especially during the months from October to April, a sifting net will be found of great service. Many species can be taken with it which would probably be missed otherwise. It is easily made by taking a circular piece of wire netting about nine inches in diameter and with a mesh of one-fourth or one-half inch, and fastening to it firmly a piece of heavy unbleached muslin, so as to make a cylindrical bag 15 to 18 inches in length. To the top of the bag should be attached a ring of heavy wire of the same diameter as the bottom, this being held in one hand the other used to grasp the bottom and shake it back and forth or up and down over a newspaper, piece of canvas or other receptacle spread out on a level piece of ground. The sifting should be done when the sun is shining, and close watch should be kept for any movement amidst the fine debris which passes through the bottom of the net. Many of the insects will immediately try to escape by running swiftly to the sides of the receptacle, but others feign death, often for several moments, then begin to kick or heave the debris, thus disclosing their presence. The sifting of moss or vegetable debris about the roots of trees or that beneath boards, partially decayed logs, piles of weeds, dry and desiccated cow or horse dung, and other similar matter will often result in the taking of many species not otherwise obtainable. Especial attention should be given to the roots of large clumps of dead grass. They should be held over the newspaper or receptacle and thoroughly pulled apart and the resulting debris then sifted. I have taken many rare species of hibernating bugs and beetles from such clumps of grass.

The use of a water net is indispensable for the taking of most aquatic Heteroptera. A form with bottom of copper wire and sides of light linen crash is sold by supply houses, but

it is rather cumbersome and unwieldy. Bueno describes one used by him as follows:

"The net ring should be of heavy wire and between 8 and 9 inches in diameter; the necessary length of wire is about 33 to 36 inches. Bend the two ends of the wire 4 inches from the tip at about right angles, then bend the wire to form the ring, so that the straightened ends will be parallel to each other. These ends should then be put into a brass or copper tube about one-half to three-fourths inches inside diameter, the latter being the better size, and about twice as long as the straight ends. The latter are fastened into the tube by pouring in melted lead. To prevent this from running out, a short cork is driven in from the lower end until it touches the tips of the ring ends. Any stick about six feet long will do for a handle. To prevent the net from being pulled off the handle, a small (one-eighth inch diameter) hole is drilled through the tube and an ordinary brass screw-eye is screwed into the handle through the hole. The net proper is made of stout brussels netting. The upper part binding around the ring is of heavy unbleached muslin and about 4 to 6 inches deep, the netting being about 4 inches deep only. Such a net as this is very strong and little likely to get tangled and torn on rocks or stumps in the water."

The ordinary butterfly or insect net with bag of gauze, brussels or mosquito netting is little used in the capture of Heteroptera, except for wary or quick flying species such as the Saldidae and some Miridae. The one advantage in its use is that the insect is visible when captured, whereas one must open the sweep net and peer into its depths, thus giving many a fine specimen a chance to dart out and away.

For the tree-inhabiting Heteroptera *beating* into an umbrella or into the sweep net above described is an excellent method of capture. Care should be taken in sorting over the debris which falls into the umbrella, as many species cling closely to the small twigs and are apt to be thrown out. If this debris be thrown onto a rubber blanket and then gone over a second time numerous specimens will often be found. In winter or early spring the beating of dead limbs, bunches of dead vines or leaves, clumps of Spanish moss and other accumulated rubbish in the forks of the branches will often bring down many hidden or hibernating species.

The larger Pentatomids, Coreids, etc., are often visible, clinging to leaf or twig and are easily taken by holding the mouth of a large bottle beneath them and letting them tumble into it. Many subaquatic or hibernating species are to be found clinging to the under side of boards or stones, or resting in the rubbish beneath them. These can be easily taken with the fingers, or preferably a pair of forceps, if one does not care to

run the risk of a severe wound by their ever ready defensive beaks. In fact, the true bugs, like the beetles, are to be looked for almost everywhere, the main requisites for a good day's capture being a quick eye and a search in all sorts of strange and unlikely places.

KILLING BOTTLES.—After capturing a specimen for a cabinet it is best to kill it as quickly as possible before its antennae, legs or other delicate appendages are broken. This is best accomplished by the cyanide bottle which is made by placing in a large mouthed bottle, preferably of the form shown in figure 4, small broken pieces of potassium or sodium cyanide to a depth of two-thirds of an inch. Cover this with about one-half

inch of plaster paris. Moisten the latter with just enough water to cause it to set and hold the cyanide in place. Then cover with two thicknesses of blotting paper so cut as to closely fit the inside of the bottle. Keep the bottle tightly corked and in a place where children cannot reach it, as the cyanide in any form is a most deadly poison. Any bug placed in the bottle will usually be killed in a few minutes. Several bottles of different sizes for both large and small specimens should be taken on each day's trip. After six months or more the cyanide usually loses its poisonous qualities and must be renewed or the bottle discarded for a fresh one. The cork for the bottle should be long, to make it easy to take out and put in. To support the insects narrow ($\frac{1}{4}$ - $\frac{1}{8}$ inch) strips of any absorbent paper should be put into the bottle. The paper also absorbs any moisture the insects give off. A little of the curled paper should be packed down, not too tightly, and the rest put in loosely, about halfway up the bottle.



Fig. 4. A cyanide bottle with paper strips enclosed to keep the insects from jostling too freely. (After Banks).

When the insect falls in, it falls among the coils and seldom gets away. The cyanide bottle, after being used several times,

will often be found to contain much moisture. It should then be wiped out with dry cotton and new pieces of blotting paper substituted for the moist ones.

The use of a liquid known as carbon tetrachloride instead of cyanide as the killing agent is recommended by Bueno. It is nonpoisonous, quick and certain of action. Of its use he says:

"A wad of absorbent cotton is put at the bottom of the tube or bottle, wet, but not dripping, with the tetrachloride. This is held in place by two or three blotting paper disks, or by one of thin sheet cork. It is well to put in another piece of cork or blotting paper about one-half to three-fourths inch above the charge to form a gas chamber. The upper partition may be held up by a short ($\frac{3}{4}$ inch) length of glass tubing slightly smaller than the inside dimension of the bottle or tube. In hot weather evaporation of the tetrachloride is rapid and it condenses on the sides of the tube, wetting the insects. This gas chamber prevents the sweating and also makes the bottle last longer. Such bottles are ready for use as soon as prepared and will last for quite some time—as much as five or six expeditions. These bottles have many advantages over cyanide. They are clean, absolutely harmless, not unpleasant in odor, easily prepared, full strength until completely exhausted, and from the point of view for their purpose, absolutely quick and efficient. Insects may be left in over night and will be quite flexible the next day. And finally, small, delicate forms may be put into smaller tubes, and the gas from the tetrachloride tube *poured in* (it being heavier than air). In this way Mirids and other delicate forms may be kept separate and quite dry. Its perfect harmlessness makes it ideal for the use of students and young collectors. Tetrachloride is cheap and easily obtained. It is not affected by the laws governing the sale of poisons."

After the day's collecting the specimens should be either mounted or, if away from home, packed for carrying or shipment. The larger ones are best transported by placing them between thin layers of felt, or of cotton separated by layers of tissue paper, in small pasteboard boxes, and these then packed firmly in small cigar boxes. If in a moist climate and packed too closely they are apt to mold in a short time. The smaller ones can be transported easily by placing a few specimens in Nos. 1 or 0 ordinary gelatine capsules with a small wad of cotton or tissue paper placed above them (not too closely) to hold them firmly in place. The harder bodied forms may also be transported in small vials of alcohol.

LABELLING SPECIMENS.—With each layer of specimens in a box or in each capsule place a label giving the date and place of capture and an accession number referring to a similar number in a notebook. This number in the book should be followed by any special data regarding the occurrence, food plant or other information concerning the specimens which may be of

value in the future. When mounted, each pin should bear below the insect a locality and date label and also the accession number referring to the notebook data. Without such labels a specimen is of little scientific value. I would at any time rather have a label without a specimen than a specimen without a label.

Dried specimens can be relaxed sufficiently for mounting by placing between thoroughly moistened layers of blotting paper in a tightly closed box or other receptacle for 10 or 15 hours. If the weather is very warm a drop or two of carbolic acid or alcohol had best be sprinkled over the blotting paper. The mold or grease on specimens can be removed by using a camel's hair brush and alcohol to which a few drops of carbolic acid have been added, or they can be immersed and soaked in carbon tetrachloride.

PINNING SPECIMENS.—In pinning a specimen of Heteroptera for the cabinet care should be taken to so locate and pass the pin as to hold it firmly, avoid the breaking of legs or the spreading of wings and, at the same time, not interfere with its future study. By experience I have learned that this is best done by passing the pin through the basal third of pronotum, inclining the point slightly backward so that it will pass through the meso- or metasternum and between the coxae, thereby holding the specimen rigidly in place. A No. 1 or 2 standard insect pin is sufficiently large for most of the true bugs.

The smaller species of Heteroptera, including most Lygaeidae and Miridae, through which a No. 1 pin cannot be passed without injury, should be mounted, as is the beetle in fig. 5, with transparent glue or shellac on the tip of a small narrow triangular card or point through the base of which a pin has been run. Only a very small amount of the glue is necessary, it being most readily applied to the card with the tip of a wooden toothpick. The legs should be carefully spread before mounting and the body then pressed down firmly

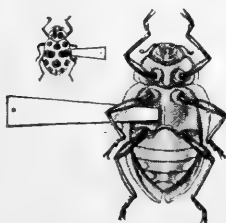


Fig. 5. Showing method of gluing an insect on a paper point.
(After Banks).

on the glued card, which should be placed at right angles on the left side of the pin with the head of the insect away from the person. The points can, with a little practice, easily be cut by a small pair of scissors from a strip of heavy drawing paper

as wide as the length of the point. The best glue which I have found for mounting is Kay's "Coaguline," which does not deteriorate with age and when too thick is thinned by the simple addition of a drop or two of water. It is made at Stockport, England, and comes in two-ounce vials. Bueno recommends a glue "made of clear white granulated cooking gelatine dissolved in glacial acetic acid and fairly thick."

MUSEUM PESTS.—All soft-bodied Heteroptera are subject to the attacks of museum insect pests, such as Dermestids, etc. They should, as far as possible, be kept in insect-proof boxes. Flakes of naphthaline kept in each box will usually serve as a repellant for such pests. Each box should be examined three or four times a year, and if by dust, exuvia or other debris, the presence of pests is indicated, a few drops of carbon bisulphide should be poured in the box and the lid quickly closed. The vapor of this will soon destroy the eggs, larvae or other living form of any pest. However, its vapor is ill-smelling, poisonous and easily inflammable, and a safe and equally effective remedy is proposed by Bueno. It is the paradichlor-benzine, used by horticulturists in killing peach tree borers. A little of this dissolved in carbon tetrachloride and poured into the box will soon vaporize and the vapor quickly kill all living forms therein.

* * *

"Joy's soul lies in the doing,
And the rapture of pursuing
Is the prize."

A DESCRIPTIVE CATALOGUE OF THE ORDER HETEROPTERA OF EASTERN NORTH AMERICA.

The Order Heteroptera, as defined on page 21, was founded by Latreille in 1810 as a suborder of Hemiptera. It comprises about 14,000 known species and in geological time dates back to the Lower Permian era. Van Duzee (1917) lists about 1,500 species from America north of Mexico, and nearly 300 have since been described from that region. The order as defined may be separated into two major divisions or suborders, as follows:

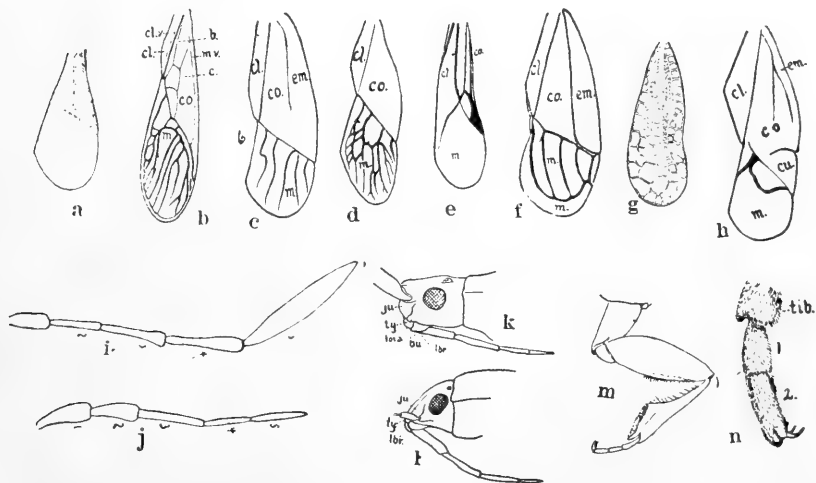


Fig. 6. Structures used in classification of Heteropteron Families. *a*, Elytron of Naegidae; *b*, of Coriscidae; *c*, of Lygaeidae; *d*, of Pyrrhocoridae; *e*, of Mesoveliidae; *f*, of Saldidae; *g*, of Tingitidae; *h*, of Miridae; *i*, antennae of Pentatomidae; *j*, of Naegidae; *k*, side view of head of Coreidae; *l*, of Lygaeidae; *m*, raptorial front leg of Nabidae; *n*, front tarsus of Gerridae. (After Parshley in Psyche).

KEY TO SUBORDERS OF HETEROPTERA

- a*. Antennae as long as or longer than head, always plainly visible; hind coxae nearly globose,¹⁰ partly received in cavities or sockets, and therefore capable of rotatory movement; hind femora not grooved; osteola usually present. Habitat mainly terrestrial, sometimes semiaquatic. Suborder I. GYMNO CERATA, p. 32.
- aa*. Antennae shorter than head and concealed in grooves or pockets on its under side¹¹ (fig. 207, *b*); hind coxae usually somewhat elongate and (except in the family Nepidae) not set in cavities, but hinged to the metasternum; femora often grooved for the reception of the tibiae in repose; osteola absent. Habitat aquatic or semiaquatic. Suborder II. CRYPTO CERATA, p. 1018.

¹⁰Except in the family Saldidae. ¹¹Visible in the Ochteridae.

Suborder I. GYMNO CERATA Fieber, 1851.

This suborder, as above defined, is separated into superfamilies (groups of families) or families, as follows:

KEY TO SUPERFAMILIES AND FAMILIES OF SUBORDER GYMNO CERATA.¹²

- a. Antennae 5-jointed,¹³ joint 1 thickened, 2 slender; (fig. 6, *i*); ocelli present; margin of head thickened above the insertion of antennae; scutellum large, often extending beyond middle of abdomen; length more than 2.7 mm.
Superfamily SCUTELLEROIDEÆ, p. 34.
- aa. Antennae 4-jointed¹⁴ (disregarding minute ring segments and antenniferous tubercles).
- b. Claws all apical; last tarsal joint with tip entire.
- c. Head shorter than pronotum, including the scutellum; pronotum and scutellum present, the latter sometimes minute.
- d. Elytra without a cuneus.
- e. Front legs not raptorial; head rarely cylindrical; prosternum without a median longitudinal stridulatory groove between the front coxae.
- f. Beak 4-jointed, the first joint often very short.
- g. Tarsi 3-jointed; body not strongly flattened both above and below.
- h. Ocelli present (except in the genus *Cnemodus* of the family Lygæidæ).
- i. Body and appendages not extremely slender; antennae not as in *ii*.
- j. Membrane with numerous more or less anastomosing veins (fig. 6, *b*); antennae inserted high, usually above a line drawn from the middle of the eye to the front end of bucculae (fig. 6, *k*). Superfamily COREOIDEÆ, p. 207.
- jj. Membrane with four or five simple veins, usually arising from the base (fig. 6, *c*); antennae inserted low on the sides of the head, usually below or on a line drawn from the middle of the eye to the front end of bucculae (fig. 6, *l*); elytra sometimes brachypterous; length variable, less than 15 mm. Terrestrial; mainly phytophagous.

Family XI. LYGÆIDÆ, p. 336.

¹²This key is frankly artificial and the superfamilies as named do not always comprise the same families as are recognized by Van Duzee in his catalogue. I have found it impossible to draw up a dichotomous key of the higher groups and superfamilies as founded by Reuter (1910; 1912b), and at the same time make it intelligible for beginners. As it is, a number of exceptions are necessary. Many of the families as here isolated possess aberrant characters very different from their allies in the superfamilies to which they are usually ascribed, and therefore of necessity cannot follow consecutively in the key the order in which they appear in the text. The key is based mainly on macropterous adults, and allowances must be made for brachypterous forms.

¹³Except in some species of *Corimelaena* and *Amnestus*.

¹⁴Five-jointed in the genera *Næggus* of the Nægeidæ and *Pagasa* of the Nabidæ; 8-jointed in *Rhiginia* of the Reduviidæ.

- ii. Body and appendages linear, extremely slender; antennæ elbowed at end of joint 1, the latter clavate; eyes distant from base of head; apical half of femora clavate. Terrestrial or thamnophilous; probably phytophagous.

Family X. NEIDIDÆ, p. 331.

- hh. Ocelli absent; membrane with two large cells at base from which extend seven or eight branching veins (fig. 6, *d*); osteola absent; length, 8—18 mm. Terrestrial or thamnophilous; phytophagous.

Family XII. PYRRHOCORIDÆ, p. 437.

- gg. Tarsi 2-jointed; body usually strongly flattened, both above and beneath.

- k. Elytra not lace-like or closely reticulate to form cells with membranous centers.

- l. Ocelli absent; body not covered with pile; membrane usually with veins; claws without arolia; length, 2.5—9 mm. Arboreal, living beneath bark.

Family IX. ARADIDÆ, p. 287.

- ll. Ocelli present; antennæ 4- or 5-jointed, joints 1 and 2 thicker than the others (fig. 6, *j*); body densely clothed with a very short velvety pile; clavus almost similar in texture to the membrane, the latter without veins (fig. 6, *a*); head and thorax sulcate beneath; length not more than 2.5 mm. Hygrophilous or semiaquatic; predaceous.

Family XXI. NÆOGEIDÆ, p. 605.

- kk. Elytra lace-like or closely reticulated to form areolæ or cells, these usually with a membranous center (fig. 6, *g*); length, less than 5 mm. Terrestrial, thamnophilous or arboreal; phytophagous.

Superfamily TINGIDOIDEÆ, p. 445.

- ff. Beak 3-jointed.

- m. Tarsi 2-jointed; ocelli present, widely separated; membrane without veins; claws (in our species) with arolia; length 1.8—2.5 mm. Arboreal on foliage of royal palm; phytophagous.

Family XIII. THAUMASTOCORIDÆ, p. 444.

- mm. Tarsi 3-jointed.

- n. Ocelli present.

- o. Membrane, when present, without veins; clavus of same texture as membrane (fig. 6, *e*); corium somewhat thickened; elytra often absent; color more or less greenish; length not more than 4 mm. Semiaquatic; predaceous.

Family XXII. MESOVELIIDÆ, p. 612.

- oo. Membrane with distinct veins, these forming three to five long closed cells (fig. 6, *f*); clavus and corium alike in texture; head short and broad; eyes large and prominent; length 2.5—8 mm. Littoral or hygrophilous; predaceous.

Family XXXIII. SALDIDÆ, p. 1002.

- nn. Ocelli absent; elytra reduced to small pads, without a membrane; length less than 6 mm. Parasitic.

Family XXIII. CIMICIDÆ, p. 616.

ee. Front legs more or less raptorial (fig. 6, *m*); head cylindrical; pronotum with a transverse groove; prosternum often with a longitudinal median, transversely striated or granulated stridulatory groove between the front coxae; beak 3-jointed (or 4-jointed with joint 1 very short), its basal joint stout, usually curved; form variable, often very slender. Predaceous species.

Superfamily REDUVIOIDEÆ, p. 501.

dd. Elytra with a cuneus and embolium¹⁵ (fig. 6, *h*); veins of membrane few, rarely free, when present usually forming one or two cells; texture usually delicate and form more or less flattened.

Superfamily MIROIDEÆ,¹⁶ p. 620.

cc. Head as long as entire thorax; body linear, legs and antennae very long, filiform; ocelli absent; beak 3-jointed, shorter than head; scutellum and elytra usually wanting; length, 8—11 mm. Semi-aquatic; predaceous.

Family XXX. HYDROMETRIDÆ, p. 964.

bb. Claws of at least the front tarsi distinctly anteapical, the apex of the last tarsal joint more or less cleft or bifid (fig. 6, *n*). Semi-aquatic or hygrophilous; predaceous.

Superfamily GERROIDEÆ, p. 967.

Superfamily SCUTELLEROIDEÆ (Burmeister), 1835, 343.

The members of this superfamily all agree in possessing 5-jointed antennae which are inserted beneath a ridge on the side of the head; ocelli present; beak 4-jointed, inserted beneath or near apex of tylus; meso- and metanotum concealed; scutellum large or very large, reaching middle of abdomen, sometimes covering almost its entire dorsal surface; clavus narrowed toward apex, not forming a commissure, corium wholly coriaceous, membrane usually with numerous veins; connexivum horizontal or slightly declivent inward; tarsi 3-jointed, rarely (subfamily Acanthosominæ) 2-jointed. The superfamily is represented in our territory by five families.

KEY TO EASTERN FAMILIES OF SCUTELLEROIDEÆ.

a. Scutellum very large, U-shaped, longer than corium, covering the greater part of abdomen, its apex broadly rounded (figs. 7, 11

¹⁵Except in the very small species (less than 1.8 mm.) of the subfamily Schizopterinae of the family Cryptostemmatidæ. McAtee & Malloch (1925a, top of page 2) state that the costa of the elytra of the family "are thickened and provided with a fracture (forming what are called embolium and cuneus)." In the second section of their key on page 3, leading up to the Schizopterinae, they say: "Costa of fore wing without a fracture"—which is true as far as the bugs are concerned.

¹⁶I have given to this group of families whose members possess a cuneus the superfamily name proposed by Kirkaldy (1906a), as the one used by Reuter and Van Duzee is based on the generic name of the "bedbug," the first Heteropteron probably known to man, both physically and scientifically. It and its close allies are so different from all other Cimicoideæ of recent literature, that that name should be applied to them alone.

and 13); frena absent, or if present, less than one-fifth the length of scutellum; opaque part of corium (fig. 12), much narrowed toward apex.

- b. Tibiae not strongly spinose; connexivum of abdomen with seven visible dorsal segments; color never shining black.
- c. Sides of pronotum without a prominent tooth or lobe in front of humeral angles, and another on front angles; hamus of inner wings present; eyes never protuberant. Habitat variable, often arboreal, usually hygrophilous.

Family I. SCUTELLERIDÆ, p. 35.

- cc. Sides of pronotum with a prominent tooth or lobe in front of humeral angles and another on front angles (fig. 11); hamus of inner wings wanting; eyes protuberant or stylated. Terrestrial and hygrophilous

Family II. PODOPIDÆ, p. 53.

- bb. Tibiae with two or more rows of strong black spines; connexivum with but six visible ventral segments; color usually shining black. Terrestrial; phytophagous.

Family III. CORIMELÆNIDÆ, p. 58.

- aa. Scutellum of medium size, shorter than corium, more or less triangular, with apex narrowed (figs. 14 and 17), rarely (*Stiretrus*) large and U-shaped, the colors then bright and contrasting; frena distinct, one-fourth or more the length of scutellum; opaque part of corium subtriangular, broad apically.

- d. Tibiae armed with two or more rows of long strong black or brown spines; front legs fossorial; length rarely more than 7 mm. Subterranean, usually ammophilous; food habits undetermined.

Family IV. CYDNIDÆ, p. 70.

- dd. Tibiae armed, if at all, only with small weak spines; front legs not fossorial; length rarely less than 7 mm. Habitat variable, often arboreal; mainly phytophagous.

Family V. PENTATOMIDÆ, p. 91.

Family I. SCUTELLERIDÆ Leach, 1815, 121.

THE SHIELD-BACKED BUGS.

Heteroptera of medium or large size and oval, usually strongly convex form, having the head triangular; eyes sessile; ocelli two; cheeks not prolonged beyond the tylus; beak 4-jointed; antennae (in our species) 5-jointed, inserted on the sides of head; pronotum more or less hexagonal, its front half often strongly declivent and lateral angles distinct; scutellum U-shaped, very large, nearly or quite reaching the tip of abdomen and often covering the whole of the elytra except the basal portion of the costal margin, its sides not furnished with a frenum or ridge on which the inner edge of the clavus rests;

corium with opaque part greatly narrowed; connexivum with seven visible dorsal segments; inner wings with primary and subtended veins rather widely separated and provided with a hamus; tibiae without distinct spines; tarsi 3-jointed.

These curious turtle-shaped bugs appear to be nowhere common in this country. As far as known they are phytophagous in habit and are, for the most part, found on the foliage of shrubs or trees in the vicinity of water. Representatives of 15 genera occur in the United States. Of these eleven, comprising 15 species, are known from the territory covered by this work. The principal literature pertaining to our species may be found in the following works: Germar, 1839; Dallas, 1851; Stal, 1867, 1870, 1872; Schouteden, 1904; Van Duzee, 1904; Hart, 1919; Stoner, 1920.

KEY TO EASTERN GENERA OF SCUTELLERIDÆ.

- a. Scutellum broadly oval, covering at least the apical third of costal border of elytra; abdomen (except in *Phimodera*) with a finely striated stridulatory area each side of middle of fourth and fifth ventrals (Subfamily *Tetyrinæ*).
- b. Pronotum without a transverse submedian groove; head gradually declivent.
- c. Second joint of antennae as long as or longer than third; length 7 or more mm.
- d. Osteolar opening not continued as a canal towards the side margin of the metasternal plate.
- e. Costal border of elytra exposed to or beyond middle of scutellum.
- f. Head longer than broad, rounded in front; abdomen usually with a broad shallow median groove; length 12 or more mm.
I. *TETYRA*, p. 37.
- ff. Head smaller, triangular, pointed in front, its sides nearly equilateral; abdomen without a median groove; length not over 10 mm.
II. *DIOLCUS*, p. 39.
- ee. Costal border of elytra covered by scutellum except at base; length 11 or more mm.
III. *CHELYSOMA*, p. 41.
- dd. Osteolar opening extended outwardly or towards the sides by a distinct canal.
- g. Osteolar canal long, its apical portion much widened, bent forward and punctured (fig. 8, a); costal border of elytra exposed not farther than middle of scutellum; head as long as broad.
IV. *SPHYROCORIS*, p. 42.
- gg. Osteolar canal shorter, nearly straight, not widened apically; costal border of elytra exposed to or beyond apical third of scutellum; head broader across the eyes than long.

- h.* Second and third joints of beak subequal in length, the fourth shorter; tube of osteole distinctly shorter than the canal, the latter almost flat, the peritreme or supporting plate shining, shallowly and sparsely punctate; length, 9—11 mm.

V. SYMPHYLUS, p. 43.

- hh.* Second joint of beak as long as third and fourth united, the third and fourth subequal; tube of osteole as long as canal, the latter distinctly grooved, the peritreme opaque, deeply and closely punctate; length 6—7 mm. VI. STETHAULAX, p. 44.

- cc.* Second joint of antennae distinctly shorter than third; osteolar canal long, slender and curved forward; length less than 9 mm.

VII. HOMÆMUS, p. 46.

- bb.* Pronotum with a distinct transverse submedian groove; head deflexed or bent downward.

- i.* Groove of pronotum narrow, sharply delimited; front of head angulate or obtusely rounded; fourth and fifth ventrals with a very finely striated stridulatory area; length, less than 6 mm.

- j.* Side margins of head and pronotum entire. VIII. CAMIRUS, p. 49.

- jj.* Side margins of head and pronotum finely and irregularly toothed. IX. ACANTHOLOMA, p. 50.

- ii.* Groove of pronotum wide, not sharply limited; front of head broad and subtruncate; ventrals without a stridulatory area; length 6—7 mm. X. PHIMODERA,¹⁷ p. 51.

- aa.* Scutellum narrow, oblong, not covering any portion of the costal border of elytra; ventrals without a stridulatory area; second joint of antennae slightly curved; length, 7 or more mm.

XI. EURYGASTER,¹⁷ p. 52.

I. TETYRA Fabricius, 1803, 128.

Species of large size, having the head nearly as broad in front as behind, tylus convex, slightly surpassing the cheeks; second and third joints of antennae (in our species) subequal, fourth nearly one-third longer, fifth equal to or slightly longer than fourth; beak reaching second ventral segment or beyond, its second joint as long as third and fourth united; scutellum very broad, covering the apical third or more of costal border of elytra; connexivum exposed beyond the middle; osteolar tube reaching middle of its supporting plate, its opening very small, the tube not continued as a definite canal, but as a broad expansion with apical margins elevated. Two of the three known North American species occur in our territory.

KEY TO EASTERN SPECIES OF TETYRA.

- a.* Antennae black annulated with white near the tip and base of each

¹⁷These two genera are, by Stal (1872), and most subsequent authors, placed in the subfamily Odontotarsinae which is separated from the Tetyrinae only by the absence of the so-called stridulatory area on the fourth and fifth ventrals. In old or dirty specimens this character is often very difficult to ascertain, and I doubt very much its being one worthy of subfamily division.

joint; beak reaching only to middle of second ventral; abdomen without a distinct median furrow.

1. ANTILLARUM.

aa. Antennae uniform piceous-brown; beak reaching or surpassing base of fourth ventral; abdomen with a wide but distinct median furrow.

2. BIPUNCTATA.

1 (1). TETYRA ANTILLARUM Kirkaldy, 1909, 284.

Broadly oval, above strongly convex. Dull reddish-brown, the head, pronotum, clavus and sides of scutellum rather thickly marked with coarse fuscous punctures having a greenish or brassy center; disk of scutellum with much finer concolorous punctures; under surface dull yellow marked with fuscous punctures; femora with reddish-brown dots; tibiae tinged with reddish; tarsi annulate, the claws in part black. Fourth antennal scarcely as long as third. Front half of pronotum declivent, broadly shallowly concave in front of humeral angles, the latter obtuse. Scutellum with sides and apical third rather strongly declivent. Male with sixth ventral and genital plate as in *T. bipunctata*, the plate with an obtuse transverse carina in front of its emarginate hind border. Length, male, 15 mm.; width, 8 mm.

Brickell Hammock, Miami, Fla., March 11; one adult male and one nymph beaten from the foliage of the potato tree, *Solanum perbasifolium* L., growing along a roadside. A West Indian species known in this country heretofore only from a few specimens taken at Key West and Biscayne Bay, Fla. Usually recorded as *T. arcuata* (Fabr.), a preoccupied name.

2 (3). TETYRA BIPUNCTATA (Herrich-Schaeffer), 1839, 87.

Broadly oval, strongly convex. Dull brownish-yellow, irregularly mottled with either aggregations of black punctures or fuscous spots, the punctures forming a number of narrow curved lines across the pronotum and scutellum; the fuscous areas, when present, often clouding the basal half of pronotum and usually forming a small rounded spot each side on basal third of scutellum; corium and clavus punctured like scutellum; membrane fuscous; connexivum usually with alternate spots of black and reddish-brown; under surface dull yellow, with numerous coarse black punctures along the sides; legs dull yellow to fuscous, marked with sparse,



Fig. 7, X 4. (Original).

coarse black punctures; tarsi piceous. Pronotum subhexagonal, the humeral angles rounded; disk with a vague transverse impression ending in a deeper one each side, this extended forward nearly to front angles. Scutellum with a rounded impression each side at base and another at middle near each margin. Male with hind margin of sixth ventral broadly concave, to receive the large semicircular genital plate. Length, 12—17 mm.; width, 8—10 mm. (Fig. 7).

Lake Co., Ind., and Royal Palm Park, Fla., June 15—Dec. 18 (*W. S. B.*). Lakehurst, N. J., and Long Island, N. Y., April 15—May 29 (*Davis*). Vienna, Va., August (*Barber*). Ranges in this country from New York and Northern Indiana south and southwest to North Carolina, Florida and Texas. Known also from Mexico and recorded by Dallas (1851, 36) from Australia. My Florida specimens were hibernating beneath the bark of pine logs. Barber records it from six different localities in that State. Like most other members of the family it appears to be rather scarce wherever found and occurs for the most part on pine. Smith (1910, 132) states that in New Jersey it: "Is sometimes found on young shoots of old pines, but is especially fond of young trees. In cold weather it often secretes itself among the dead needles that accumulate on the upper side of the horizontal branches of pitch pine." Davis (1911, 113) says that "when the legs are rubbed against the file-like structures of the stridulatory areas the insect makes considerable noise."

II. *DIOLCUS* Mayr, 1864, 904.

Species of medium size and oval convex form having the head short, triangular, nearly equilateral, more or less pointed in front; tylus almost flat, slightly surpassing the cheeks; second and third antennals subequal, each two-thirds the length of fourth which is slightly longer than fifth; beak very slender, reaching first ventral, its second and third joints nearly equal; pronotum short, subhexagonal, its margins more or less reflexed; scutellum as in *Tetyra*; connexivum exposed for nearly its full length; osteole in the form of a short tube, reaching to middle of its supporting plate. Four species are recorded from North America, two of which occur in the southern states.

KEY TO EASTERN SPECIES OF *DIOLCUS*.

- a. Punctures of upper surface reddish or purplish, those beneath few

and widely scattered; sixth ventral of male with hind margin broadly emarginate or concave. 3. *IRRORATUS*.

- aa.* Punctures green, those on sides of under surface numerous and somewhat crowded; sixth ventral of male with hind margin entire and broadly rounded. 4. *CHRYSORRHÆUS*.

3 (9). *DIOLCUS IRRORATUS* (Fabricius), 1775, 699.

Broadly oval, convex. Above dull yellow, thickly and irregularly marked with brownish-red punctures, the smooth spaces showing as yellow spots on occiput and forming a large triangular spot each side on front half of pronotum and numerous small scattered ones on scutellum; connexivum with alternating punctured spots of dull red and smooth ones of yellow; beneath yellow with widely scattered round purple dots, each enclosing a small puncture; antennae and legs yellow, the latter marked with small red dots. Head longer and more pointed than in *chrysorrhæus*. Pronotum with lateral angles obtusely rounded, the adjacent sides behind them feebly sinuate; disk finely, irregularly, somewhat sparsely punctate and with an ill-defined triangular impression each side. Scutellum broadly oval, covering only the apical third of elytral costal border. Median plate of genital segment of female much broader than long. Other characters as in generic description. Length, 8—9 mm.; width, 6—6.5 mm.

Dunedin, Caxambus, Chokoloskee, Royal Palm Park, Cape Sable and Key West, Fla., Dec. 17—April 5. Recorded also from Punta Gorda, Biscayne Bay and Fernandino. This prettily marked Scutellerid is a West Indian species, known in the United States only from Florida, where it occurs almost exclusively on the foliage of the black mangrove, *Rhizophora mangle* L., on the keys and along the edges of the tidewater lagoons.

4 (10). *DIOLCUS CHRYSORRHÆUS* (Fabricius), 1803, 138.

Form of *irroratus*. Above dull reddish-yellow, marked with numerous large metallic green punctures, and usually irregular fuscous spots, the latter, when present, forming several large blotches on basal half of pronotum, covering the apical third or more of scutellum and forming a small round submarginal spot each side near its middle; beneath dull yellow with numerous coarse green punctures along the sides; antennae and legs yellow, the latter with scattered reddish-brown dots. Structural characters much as in *irroratus*, the head shorter, broader, with apex less pointed than there. Median genital plate of female triangular, longer than broad. Length 8—9 mm.; width 6—7 mm.

Sanford, Dunedin, Royal Palm Park and Cape Sable, Fla., Dec. 8—June 6. Recorded also from Jacksonville, St. Augustine, Green Springs and Indian River District, Fla. Ranges from South Carolina and southern Florida to Texas. Hibernates in bunches of Spanish moss and occurs especially on foliage of

shrubs and trees about the borders of wet hammocks. Three of the 12 specimens at hand have the fuscous blotches of upper surface wholly absent. The *Scutellera viridipunctata* of Say (1831, 1) is a synonym.

III. CHELYSOMA Bergroth, 1891, 235.

Species above the average in size and with broadly oval convex form, having the head triangular, longer than wide, its apex obtusely pointed; cheeks convex, a little shorter than tylus; beak reaching middle of second ventral, its second joint slightly longer than third and fourth united; second antennal slightly longer than third, fourth and fifth stouter and subequal, each about one-third longer than second; pronotum with lateral angles obtusely rounded; scutellum covering apical two-thirds or more of costal margin of elytra; connexivum wholly concealed; osteolar tube reaching middle of its supporting plate.

Stal (1867, 493) founded the genus *Orsilochus* for five species before included by their authors in the old genus *Pachycoris* Burm. Bergroth (loc. cit.) showed that Stal's name was pre-occupied and proposed *Chelysoma* in its stead. Four of the known species occur in the West Indies, Mexico or South America, the other in the southern states.

5 (5). CHELYSOMA GUTTATUM (Herrich-Schaeffer), 1839, 4.

Black, shining, both above and beneath, and irregularly marked with numerous coarse punctures, also with bright yellow smooth spaces as follows: head usually with an interrupted line each side and a short median occipital one, disks of pronotum and scutellum with numerous transverse wavy lines, scutellum also with three small irregular spots across the base; front and side margins of pronotum, exposed costal portion of elytra and sides of abdomen narrowly edged with bright yellow; first two or three joints of antennae in part or wholly yellow, the fourth and fifth piceous, pubescent; legs yellow, the tarsi fuscous. Abdomen with sides coarsely and rather closely punctate, the middle smooth. Structural characters as given under generic heading. Length 11—13 mm.; width 7—8 mm.

Dunedin and Royal Palm Park, Fla., Nov. 17—April 2. Occurs on the goat's foot morning glory, *Ipomœa pes-caprae* Sweet, along the bay front in November, and hibernates among the roots of clumps of grass. Jacksonville and Lakeland, Fla., Nov. 3—7 (Davis); recorded also from numerous stations in that State. Mobile, Ala., April 5—June 4 (Gerhard). Known elsewhere only

from Georgia and North and South Carolina. Van Duzee (1909, 153) took it from rank vegetation on the borders of the tidal marshes at Ft. Myers, Fla., in May and it was beaten from scrub oak Aug. 1, at Wilmington, N. Car., by Engelhardt. The yellow markings of the upper surface vary greatly in number and shape.

IV. SPHYROCORIS Mayr, 1864, 904.

Species of small size and broadly oval form having the head triangular, nearly as broad as long, its apex obtusely rounded; tylus convex, slightly exceeding the cheeks; beak as in *Chelysoma*, reaching middle of second ventral; joints 1—3 of antennae subequal in length, fourth and fifth also subequal, but one-third longer; connexivum exposed for three-fourths its length. Other characters as given in generic key, the principal distinguishing one being the peculiar form of the osteolar canal. (Fig. 8, a).

Two species are known, one from Mexico, the other from the southern and southwestern United States.

6 (12). SPHYROCORIS OBLIQUUS (Germar), 1839, 94.

Above dull brownish-yellow, marked with numerous fuscous punctures and piceous or fuscous streaks and blotches, the latter forming two vague stripes on head, often covering the greater part of basal half of pronotum and usually forming a wide oblique stripe on scutellum; this sometimes absent and the scutellum then marked with narrow broken transverse fuscous lines, much as in pale examples of *Diolcus chrysorrhæus* (Fabr.); connexivum dull red, the edge of each segment in part fuscous; beneath dull yellow, thickly flecked with fuscous punctures, the narrow margins of cheeks, flanks of pronotum to near the hind angles and the front angles of the ends of ventrals a brighter yellow; antennae and legs dull yellow, the latter with numerous fuscous dots and blotches. Thorax subhexagonal, its lateral angles obtusely rounded, the margins behind them, as well as basal margin, more or less sinuate. Scutellum with a broad shallow oblique impression each side near base. Female with median plate of genital segment rounded, very small. Length, 7—8.5 mm.; width, 5—6 mm. (Fig. 8).

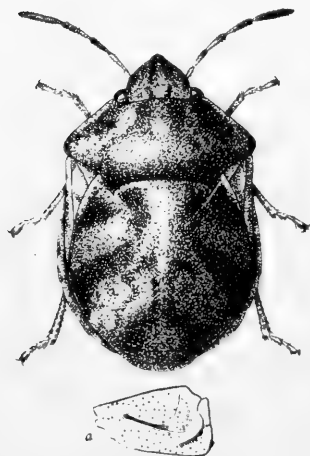


Fig. 8. X 5. a, showing form of osteolar canal. (Original).

Dunedin, Bradentown, Royal Palm Park and Cape Sable, Fla., Nov. 18—Aug. 12. Probably occurs throughout that State, as Barber records it from eight different stations. Ranges from southern Florida to Arizona, Texas and California. Originally described from Martinique and known also from Mexico and Grenada. About Dunedin it has been taken sparingly from the axils of thistle leaves and by sweeping herbage in low sandy glades and along the bay front. The fuscous markings of the upper surface are extremely variable in extent and character, but the majority of specimens are darker in hue than those of allied forms.

V. SYMPHYLUS Dallas, 1851, 37.

Broadly oval, moderately convex species having the head triangular, about as broad as long; second antennal slightly longer than third, fourth and fifth subequal, each one-half longer than third; beak reaching to or slightly beyond base of second ventral, its second segment but little longer than third; pronotum subhexagonal, its front portion strongly declivent, lateral angles more posterior than in *Diolcus*, its front side margins longer and not reflexed as there; scutellum less convex, its apical third flattened and strongly declivent; embolium of elytra wholly exposed; stridulatory area of abdomen very large, covering most of the central part of the fourth and fifth and the base of the sixth ventrals.

This genus is closely related to both *Diolcus* and *Stethaulax*. From the former it may be readily known by the presence of the osteolar canal and from the latter by the relatively longer third joint of beak and steep declivity of scutellum, this, in our single species, being distinctly carinate. Eight species are recognized by Stal (1867, 495), all from Tropical America and the West Indies. One of these, not included by Van Duzee in his Catalogue, occurs in Georgia and Florida.

7 (—). SYMPHYLUS DEPLANATUS (Herrich-Schäffer), 1839, 3.

Upper surface dull reddish-brown, sparsely and rather finely punctate and usually more or less marked with fuscous, this sometimes forming large irregular blotches on basal half of thorax and a vague oblique stripe on scutellum, but more often reduced to short broken transverse lines on the latter; declivity of scutellum frequently with a large bilobed black spot covering its upper two-thirds; connexivum usually with alternate pale and fuscous spots, the latter formed of dark punctures; under surface dull yellow, marked with rather small dark brown punctures,

these numerous along the sides, but sparse and much scattered on middle of abdomen; antennae and legs yellow, the latter with numerous large black dots. Head nearly an equilateral triangle, its apex obtuse. Pronotum as described above, its posterior side margins sinuate, disk with a small nodule near each hind angle, and a large shallow impression behind each front one. Scutellum with posterior declivity feebly but distinctly carinate and sides rather strongly sloping downward. Male with hind margin of sixth ventral broadly and deeply concave; genital plate twice as wide as long, its hind margin emarginate. Female with medium segment of genital plate very small and rounded. Length 8—11 mm.; width 5—7 mm.

Dunedin, Lakeland, Istokpoga, Miami, Royal Palm Park and Cape Sable, Fla., Nov. 21—April 12 (*H. S. B.*). Ft. Valley, Ga., April (*U. S. N. Mus.*).¹⁸ Recorded also by Barber from Enterprise, Fla. It is a tropical form originally described from Rio Janeiro and Bahia, Brazil, and recorded by Uhler (1886, 2) from Mexico. About Dunedin it is, next to *Homœmus parvulus* (Germ.), the most common member of the family, occurring in fall and spring mostly on the foliage of the wax-myrtle, *Cerothamnus ceriferus* (L.) and hibernating in bunches of Spanish moss, the axils of thistles and other convenient hiding places. Like some of its allies it is very inconstant in its markings. The punctures of pronotum and scutellum, usually blackish, are sometimes in part as green as those of *Diolcus chrysorrhæus*. The fuscous spots vary exceedingly in form and size. Of 16 specimens before me, six, equally divided as to sex, have the declivity of scutellum almost covered by a large sharply defined piceous spot, this being deeply emarginate on its hind border. In the other specimens no trace of this spot is visible and some of them are almost devoid of fuscous markings; while one from R. P. Park has both pronotum and scutellum in great part black. This is doubtless the species mentioned by Malloch (*Hart*, 1919, 171) as being in the Bolter collection from Indian River and Point Orange, Fla. As already stated it is not included in the Van Duzee Catalogue, being confused by that author with *Stethaulax marmoratus* (Say), he having so identified specimens of the *Symphylus* for me.

VI. STETHAULAX Bergroth, 1891, 235.

Small broadly oval, somewhat flattened species having the head short, broad, almost flat above; tylus feebly convex,

¹⁸Sent me as *Stethaulax marmoratus* (Say).

slightly surpassing the cheeks; beak reaching middle of second ventral, its second joint almost as long as third and fourth united; second antennal (in our eastern species) more slender and nearly one-half longer than third, the latter subclavate; fourth and fifth joints subequal, much stouter and more than one-half longer than second. Pronotum subhexagonal, its lateral angles obtusely rounded; disk less declivent in front than in preceding genera. Scutellum covering one-half or more of costal border of elytra. Osteolar canal straight or feebly curved, reaching nearly to tip of its supporting plate, its apex obtuse.

This genus was first characterized by Uhler (1871, 93) as *Aulacostethus*, this name, as shown by Bergroth, being preoccupied. One species is known from our territory and another from Arizona and California.¹⁹

8 (11). *STETHAULAX MARMORATUS* (Say), 1831, 2; I, 310.

Dull reddish-brown, irregularly marked with fuscous, the latter forming several narrow, transverse lines on pronotum and numerous similar lines and blotches on scutellum; disk of scutellum with many widely scattered, small, slightly elevated smooth yellow spaces; connexivum with alternating reddish-yellow and fuscous spots; under surface dull yellow, the sides of pleura and abdomen with numerous fuscous or reddish-brown punctures; antennae and legs yellow, the latter with fuscous or reddish-purple dots. Head densely, shallowly and confluent punctate. Pronotum less densely punctate, the punctures separated by at least their own diameters and mostly arranged in sinuous transverse lines. Scutellum more densely and deeply punctate, the intervals between the punctures minutely alutaceous; its disk with a faint median carina in front of declivity. Sixth ventral of male broadly concave; genital plate semicircular, one-half wider than long. Length, 6—7 mm.; width, 4.5—5.5 mm.

Lakehurst, N. J., May 7—Sept. 16 (*Barber and Davis*). While the known range of this species extends from New York and Maryland to Georgia and Texas, it has not been taken in

¹⁹This is what I take to be the *Aulacostethus simulans* of Uhler (1876, 272) described from near San Francisco. Van Duzee (1904, 76), after an examination of a single female in the Henshaw collection, which had been determined as *simulans* by Uhler, pronounced it "but a clearly marked example of *marmoratus*," thus relegating to synonymy Uhler's name on color characters alone, without examining his type. Examples of a *Stethaulax* at hand from Arizona differ distinctly from the eastern form in the following structural characters: Larger, 8.5—9 mm.; head longer, more deeply sinuate in front of eyes, less densely punctate above; third antennal longer, subequal to second; thorax and scutellum much more sparsely and shallowly punctate, not alutaceous between the punctures; osteolar canal more slender, its apical portion tapering and slightly curved, its supporting plate very different in sculpture, the punctures being sparse, shallow and ill defined, whereas in the eastern form they are more numerous, deeper and well marked. While Uhler's original description of his *simulans* was based mainly on color characters, an exceedingly variable feature in the Scutellerids, it agrees with this western form sufficiently to lead me to believe that it represents his species. At any rate it is very different in the characters mentioned from the eastern *marmoratus* Say.

Indiana, and but a single specimen is known from Illinois. This was taken at Cobden, May 9, by Malloch, who states (1919, 171) that he cannot detect the central ridge dividing the sulcus on dorsal face of tibiae, which character was used by Hart to separate *Stethaulax* from *Symphylus*. This central ridge is not present in the specimens at hand. The insect is said to occur on cedar.

VII. HOMÆMUS Dallas, 1851, 36.

Scutellerids below the medium in size and of oval convex form, having the head slightly longer than broad, rounded in front; tylus convex, distinctly surpassing the cheeks; first and second antennals subequal in length, third distinctly longer than second, fourth and fifth slender, subequal, each one-fourth or more longer than third; beak reaching to or slightly beyond middle of second ventral, its second joint longer than third and fourth united; pronotum subhexagonal, its front gradually, not strongly declivent, the lateral angles somewhat broadly rounded, front side margins more or less reflexed; scutellum reaching tip of abdomen, covering one-half or more of costal border of elytra; connexivum narrowly or not at all exposed; front margin of sternum produced forward concealing the base of antennae; osteolar canal long, reaching almost to outer margin of its supporting plate, then bent or curved forward but not widened apically or punctured as in *Sphycorhis*.

Five species are listed by Van Duzee as occurring in the United States, three of which are found east of the Mississippi River.

KEY TO EASTERN SPECIES OF HOMÆMUS.

- a.* Head not or very minutely pubescent and without pale margins; costal border of elytra with black markings; length, 7—9 mm. 9. *ÆNEIFRONS*.
 - aa.* Head with distinct prostrate yellowish pubescence, its side margins distinctly paler than the center; costal border pale throughout.
 - b.* Sides of pronotum straight or nearly so; margins of the abdomen without black spots; larger, length, 6—8 mm. 10. *BIJUGIS*.
 - bb.* Sides of pronotum feebly but evidently concave at middle; side margins of abdomen with a small black spot near the hind angle of each segment; smaller, length, 4.5—6 mm. 11. *PARVULUS*.
- 9 (14). *HOMÆMUS* *ÆNEIFRONS* (Say), 1824a, 299; I, 199.

Dull brownish-yellow varied with fuscous; head and a vague triangular

spot behind front angles of pronotum bronzed, shining; the fuscous usually showing as narrow interrupted transverse lines on pronotum and

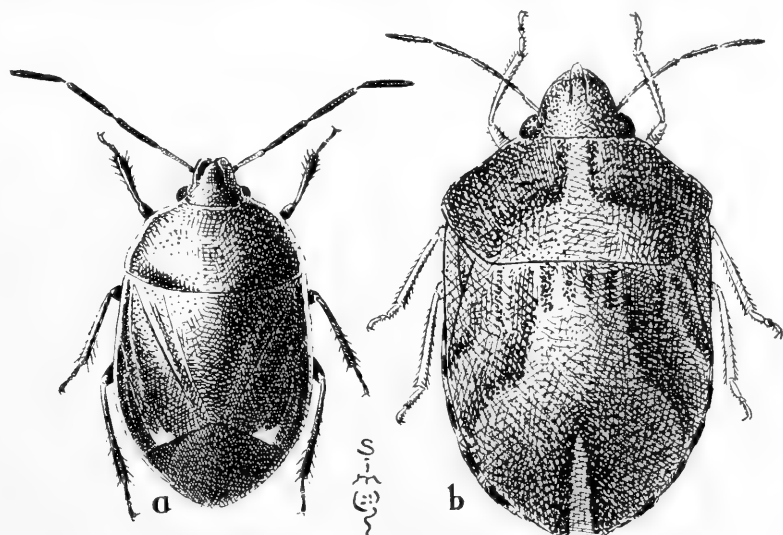


Fig. 9. a, *Schirus cinctus* (P. B.); b, *Homocidus anciprion* (Say) X 8.
(After Drake, Tech. Pub. 16, N. Y. St. Coll. For.).

scutellum, though sometimes forming irregular blotches on each or both; beneath brighter yellow, thickly marked along the sides with blackish punctures; antennae fuscous, the basal joint paler; legs yellow with black dots. Head densely, finely rugosely punctate. Pronotum rather sparsely and irregularly punctate and with a broad shallow impression near each side margin. Scutellum more closely and regularly punctate. Osteolar canal gradually curved forward near its outer extremity. Middle portion of sixth ventral shorter and broader than in *bijugis*, its apex subtruncate. Length, 7—9 mm.; width, 5—6 mm. (Fig. 9, b).

Lake Co., Ind., July 14, (H. S. B.). Havana, Ill., June 29—Aug. 15 (Hart). In both states it is scarce and usually taken in sweeping or beneath cover in grassy, sandy areas. Ranges from Quebec and New England across the continent to Vancouver and California, and southwest to New and Old Mexico, but not as yet recorded from south of Maryland in the Atlantic States. Uhler (1876, 272) states that in Maryland it “occurs but rarely and seems to affect the colder parts of the State, where the vegetation is from a week to ten days later in developing than in the lowlands of the warm areas.” In Colorado he states (1877, 365) that it was “swept from the rank growing weeds skirting or not remote from the water courses.” Van Duzee (1905, 548) mentions it as being “generally dis-

tributed and common in the Adirondacks of New York, where there were low marshy spots with carices intermixed with the swamp grasses." Parshley (1923, 782) states that he has taken it "in large numbers in late fall in the White Mountains by sweeping *Solidago*."

10 (15). *HOMÆMUS BIJUGIS* Uhler, 1872, 393.

Form of *æneifrons* but averaging a little smaller. Color much as there, the ground hue usually paler and head with a rather wide dull yellow stripe each side; narrow reflexed margins of pronotum and connexivum clear yellow; pronotum usually with four vague dusky stripes, these continued obliquely backward onto scutellum, also with a blackish spot in the depressions near front angles; scutellum of female with a narrow sutural paler stripe, this gradually widened and faintly bordered with fuscous on the declivity; male smaller with all these markings much less distinct, the scutellum being darker with numerous broken transverse fuscous lines as in *æneifrons*; under surface and appendages colored as in that species, the dark punctures in the paler females being less evident. Head, pronotum and scutellum more finely and regularly punctate than in *æneifrons*; apex of osteolar canal less curved. Middle lobe of sixth ventral longer, narrower and more rounded in front than there. Length, 6.5—8 mm.; width, 4.5—5 mm.

Union Grove and Elizabeth, Ill., July 7—13 (*Hart*). Ranges from western Illinois and Minnesota to Utah, British Columbia and California and south to New Mexico and Arizona. Occurs usually in sandy regions and is said to be frequent in the arid plains bordering the Rocky Mountains. Uhler (1877, 365) reports it as "not uncommon in the city of Denver, particularly on rank growing plants in damp situations." Stoner (1920, 18) says that in western and northwestern Iowa it is abundant at certain seasons, most of the specimens being taken from prairie and blue-grass pastures along the edges of woods. The nymphs were more common in June, the adults in August.

11 (16). *HOMÆMUS PARVULUS* (Germar), 1839, 107.

Size smaller and form more narrowly oval and convex than in the two preceding. Dull grayish-yellow, marked above with numerous fuscous punctures, these in part aggregated to form four vague dark stripes extending from front of pronotum backward over the scutellum, the latter with a narrow pale sutural stripe, this abruptly widened and bordered with fuscous at declivity, then narrowed with sides parallel to the apex of scutellum; head bronzed, with a yellowish stripe each side. Under surface dull yellow, with numerous fuscous punctures along the sides; legs yellow with black dots; antennae and tip of beak piceous. Head narrower in front and more finely punctate than in *æneifrons*.

Pronotum with lateral angles more flattened and less rounded. Connexivum narrowly exposed. Osteolar canal more abruptly bent than in either of our other species. Length, 4.2—6 mm.; width, 3—4 mm.

Dunedin, Kissimmee, and R. P. Park, Fla., Nov. 18—Apr. 26. Recorded from numerous other stations in that State. Its known range extends from southern Illinois (Hart, 1919, 170) and North Carolina south and west to Kansas, Colorado, California and Mexico. About Dunedin it is the most common of the Scutelleridae, hibernating beneath cover throughout the winter, and more abundant in spring, when it is taken by sweeping tall grasses about ponds and low shrubs in open sandy places. By most authors it has been listed as *H. grammicus* (Wolff), but that name was shown by Kirkaldy to belong to another form. The specific name *parvulus* is well applied, the males being one of our smallest forms of the family.

VIII. CAMIRUS Stal, 1862, 57.

Small oval or oblong-oval, convex species having the head about as broad as long, rounded in front, strongly declivent; tylus convex, slightly longer than cheeks, the latter with side margins sinuate; antennae with first and last joints subequal and longest, second and fourth subequal, each slightly longer than third; beak reaching first ventral, its second joint nearly one-half longer than third and fourth united, these subequal, somewhat flattened and finely carinate; pronotum with disk uneven and with a narrow transverse median groove, its lateral angles obtusely rounded; scutellum covering the costal border of elytra except the basal fourth; connexivum narrowly exposed; osteolar opening very small, without either visible tube or canal.

Two species are known from the United States and three others from Mexico. But one is found in our territory.

12 (6). CAMIRUS POROSUS (Germar), 1839, 108.

Dull black, thinly clothed with minute prostrate, grayish pubescence; upper surface finely, closely and deeply punctate; antennae and tarsi piceous; connexivum with a minute smooth white spot near each incisure. Pronotum with front side margins sinuate or concave; disk with a narrow transverse line in front of the deeper submedian groove, and a broad vaguely defined impression each side. Scutellum with disk somewhat uneven and with a narrow transverse impression across its basal third, this ending each side in a rather deep oblong impression. Under surface

with sides shallowly finely and rather closely punctate; the middle of abdomen more sparsely so. Length, 4—4.5 mm.; width, 3 mm.

Dunedin and Caxambas, Fla., Feb. 8—March 8. Recorded also by Barber from Estero, Biscayne Bay and Key Largo, May–November. Germar's type was from California and in this country it is recorded only from that State, Vancouver, B. C., Texas and Florida. My specimens were taken by sweeping low shrubs, as huckleberry, etc., in open pine woods. The *C. pullatus* Dist. from Guatemala and Colombia is a synonym.

IX. ACANTHOLOMA Stal, 1867, 491.

Small oval species, very closely related to *Camirus*, but less convex, with head and pronotum broader, their side margins finely and irregularly toothed; second antennal twice the length of third. But one species is known.

13 (8). ACANTHOLOMA DENTICULATA Stal, 1870, 17.

Oblong-oval, moderately convex. Dull black, minutely pubescent with yellowish prostrate hairs; antennae and tarsi dull brownish-yellow; scutellum with a small round smooth pale spot each side at base. Head strongly declivent, rounded in front, coarsely, densely, cribrately punctate, its side margins carinate, the carinae dentate, broadly interrupted near base, forming a short toothed lobe in front of eyes; tylus scarcely longer than cheeks, separated from them each side by a deeply impressed line. Pronotum at apex one-third wider than head, its disk more finely punctate, the submedian transverse groove deepest at middle; lateral angles broadly rounded, front side margins almost straight, finely dentate. Scutellum covering both elytra and connexivum, its disk at middle a little more sparsely and deeply punctate than pronotum, with a vague transverse curved line across basal third and traces of a median lengthwise carina. Under surface closely and finely punctate, the center of abdomen more sparsely so, the fourth and fifth ventrals with a smooth oblong space each side of middle. Genital plate of male broadly semicircular with a fine median *lengthwise* carina on front portion, behind which is a transverse impressed line followed by a fine transverse carina; punctures on front portion each side of median carina deep and closely placed; hind or apical margin of the plate truncate. Length, 5.3—5.7 mm.; width, 3—3.5 mm.

Lake Co., Ind., June 4 (*Gerhard*); taken from beach drift. Northern Illinois (*Hart*). Described from Illinois and recorded also by Van Duzee from Indiana and Kansas.²⁰ Resembles

²⁰A male in the U. S. National Museum from Riley Co., Kansas, collected by Marlatt in June and determined by McAtee as *A. denticulata*, differs from typical Illinois specimens of that sex as follows: Smaller, length 5 mm.; antennae and tarsi darker, pale spots at base of scutellum one-half the size; genital plate without carinae or transverse impression, its surface even, with finer, much more shallow punctures and hind or apical margin distinctly convex. It may be known as var. *kansiana*.

closely *Camirus porosus* (Germ.), but easily separated by the toothed margins of head and pronotum and white spots at base of scutellum.

X. PHIMODERA Germar, 1839, 60.

Small oblong-oval species having the head strongly declivent, its front broad and subtruncate; tylus strongly convex, but slightly surpassing the cheeks; antennae with first and second joints subequal, third slightly shorter, fourth and fifth each one-half longer than second; beak scarcely reaching first ventral, its third and fourth joints flattened, together scarcely as long as second. Pronotum with disk uneven, due to the broad, ill defined transverse median groove which ends each side in an irregular oblique impression; lateral angles obtusely rounded, shallowly notched behind the apex; front side margins sinuate, the hind ones rounded into base. Scutellum broadly oval, covering apical two-thirds of costal border of elytra; connexivum narrowly exposed. Osteole indistinct without evident canal. Abdomen evenly punctate without trace of stridulatory smooth areas.

Three species are known from the United States, one of which occurs in our territory.

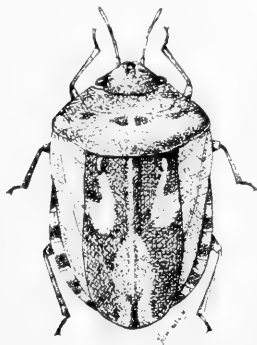
14 (24). PHIMODERA BINOTATA (Say), 1824a, 298; I, 198.

Oblong-oval, moderately convex. Dull brownish-yellow varied with fuscous, this forming three vague stripes on head and pronotum, and an irregular blotch in each of the basal depressions of scutellum; the narrow border of pronotum and some short oblique lines on sides of scutellum also fuscous; scutellum with a smooth oblong raised space in and back of the basal depressions a brighter yellow; connexivum with a small, pale smooth tubercle on each incisure; under surface largely fuscous, the thoracic pleura in part dull yellow; antennae and legs fuscous with paler markings. Upper surface finely and rather closely punctate, the scutellum with a faint median carina. Genital plate of male broadly semi-circular. Other characters as in generic description. Length, 6.5—7 mm.; width, 4—4.5 mm.

Havana, Ill., April 6, (*Hart & Malloch*). Other specimens were taken by Hart near Havana May 31 and Oct. 29. They were found beneath cover in blowouts in the sand dune region. Zimmer (1911, 240) records the finding, on Sept. 23, of a single male near Halsey, Nebr., in a similar habitat. Known elsewhere only from Colorado. Say's types were from the "Northwest Territory."

XI. EURYGASTER Laporte, 1832, 69.

Species of medium size and subdepressed oval form, having the head about as broad as long, rounded in front; cheeks as long as tylus, sometimes (in foreign species) meeting beyond it; second and fourth antennals subequal, each about one-third longer than third, fifth longest; beak scarcely surpassing hind coxae, second joint longer than third and fourth united, these subequal, not flattened. Pronotum hexagonal, its lateral angles broadly rounded, front side margins straight. Scutellum oblong, much narrower than the abdomen; clavus and costal border of elytra fully exposed; connexivum wide, flattened, exposed except at base. Osteole extended in the form of a straight and narrow canal which reaches beyond middle of its supporting plate. Two species are known from the United States, one of which occurs in the eastern states.



15 (19). EURYGASTER ALTERNATA (Say), 1828, pl. 43; I, 94.

Oblong-oval, subdepressed. Above dull yellow marked with numerous fuscous punctures, these aggregated to form many short oblique lines on scutellum; head often with two short fuscous occipital stripes; antennæ fuscous, the basal joint paler; scutellum with a curved narrow elevated smooth yellow line near base, this extended backward in the form of a fine median carina which is evanescent behind the middle; connexivum with alternating spots formed of blackish punctures; under surface brighter yellow marked with scattered fuscous punctures; legs yellow with black dots. Pronotum finely, sparsely irregularly punctate, its disk with a vague narrow smooth median line and a large oblong shallow depression each side. Other structural characters as given above. Length, 7.5—9 mm.; width, 6.5—7 mm. (Fig. 10).

Lake Co., Ind., May 12. Ranges from Quebec and New England to Vancouver, south to New Jersey, Maryland, New Mexico and California. In Indiana it appears to be very scarce, my two specimens from the State being found beneath prickly pear cactus growing near a swale in the dune region south of Lake Michigan. On the other hand, Van Duzee (1904, 18) reports it as "probably the most abundant and universally distributed Scutellerid found in North America. I once took it in great numbers from sedges on the flats bordering a stream

near New Haven, Conn., and everywhere it shows a preference for swampy spots." Uhler (1878, 368) states that "it is common in Illinois and Massachusetts," but Hart (1919, 168) mentions the taking of it by him only in one locality (Sun Lake, Lake Co.), in Illinois, though other specimens in his collection are labelled "N. Ill." In Iowa Stoner has swept it in small numbers "from timothy and blue-grass growing on low swampy prairie and along roadsides." The color varies greatly, fresh specimens sometimes having the entire upper surface tinged with pinkish, while in others the connexivum is devoid of dark spots.

Family II. PODOPIDÆ Dallas, 1851, 51=(*Graphosomatina*).

THE TERRESTRIAL TURTLE BUGS.

Species of small size and oblong-oval form, having the head porrect; eyes prominent, subpedunculate; antennae shorter than head and pronotum united, more or less clavate, their base with a distinct tubercle between it and eyes; pronotum with a single prominent lobe or tooth in front of each lateral angle and another, usually smaller one, at each front angle, the sides therefore more or less concave and the lateral angles emarginate (fig. 11); scutellum oblong U-shaped, its apex broadly rounded, nearly or quite reaching tip of abdomen, but not covering the basal portion of corium; frena absent or very short; corium with opaque portion narrow, triangular, the apical margin very oblique; inner wings with hamus wanting, the base of median and subcostal veins approximate, subparallel.²¹

The family is represented in this country by but three genera, two of them in our territory. The species are terrestrial and subaquatic, occurring amidst the roots of clumps of grass and beneath debris along the margins of ponds, sloughs and streams. The principal literature treating of our species is by Say, 1828; Stal. 1872; Van Duzee, 1904; Schouteden, 1905-'06; Hart, 1919; Blatchley, 1924.

²¹By recent authors the species comprising this group have usually been treated as an aberrant subfamily, the *Graphosomatina* of the *Pentatomidæ*. However, the size and form of scutellum, absence of frena, peculiar shape of pronotum and corium and other characters above mentioned are fixed and striking and of greater taxonomic value than those separating many families of *Coleoptera*. The habitat is also different from that of other *Pentatomids*. I have therefore followed Dallas and other of the older authors and raised the group to family rank. By so doing necessary exceptions in the family key are avoided. The family is placed next to the *Scutelleridæ*, with which it is apparently more closely allied than with the *Pentatomidæ*.

KEY TO EASTERN GENERA OF PODOPIDÆ.

- a.* Front angles of pronotum bearing a prominent toothed lobe; tubercles at base of antennae not prominent or toothed; cheeks convex, meeting in front of tylus. I. ONCOZYGIA.
- aa.* Front angles of pronotum bearing an acute or obtuse unarmed tooth; tubercles at base of antennae ending in a curved tooth or spine; cheeks flattened, not meeting in front of tylus. II. PODOPS.

I. ONCOZYGIA Stal, 1872, 15.

Small oblong-oval, sub-convex, species having the head but slightly shorter than pronotum, of nearly equal width throughout, its sides obtusely sinuate; cheeks swollen, convex, their tips rounded and contiguous in front of tylus; antennae short, second joint reaching apex of head, first and fourth joints subequal in length, fifth longer, stouter and fusiform; beak reaching middle coxae; pronotum strongly narrowed in front, disk with an obtuse submedian transverse impression; scutellum reaching tip of abdomen, its sides on basal half parallel, then slightly diverging and curved to form a semicircular rounded apex, disk with an oblique impression each side near base; sterna not sulcate or carinate. Other characters as in key. But one species is known.

16 (72). ONCOZYGIA CLAVICORNIS Stal, 1872, 16.

Oblong-oval, subdepressed. Dull piceous-brown, very sparsely furnished with short inclined yellowish hairs; antennae, tibiae and tarsi reddish-brown; hind angles of connexivals yellowish. Pronotum densely punctate, disk of front lobe with a rounded tubercle each side, the lobe on front side margins narrow with a single tooth in front, an obtuse one behind, sinuate between the two; hind lobe with side margins obtusely toothed in front. Connexivum narrowly exposed. Other characters as above. Length 3.5—5 mm.

Brownsville, Tex., July (*Barber*). Bueno (1920, 70) records it from Ashby, Fla.; known elsewhere only from Fort Monroe, Va., and Vancouver. The Texas specimen at hand is covered with a grayish crust. A rare species wherever found.

II. PODOPS Laporte, 1832, 72.

Species of medium or small size and oblong-oval subconvex form, having the head longer than wide, narrower in front of eyes, tylus strongly convex, forming a distinct ridge along its

middle; cheeks flattened, equalling or slightly surpassing tylus but not contiguous in front of it; beak reaching or surpassing the middle coxae, its first joint scarcely reaching the base of bucculae; pronotum about one-third longer than head, divided transversely near middle by a rather wide, ill-defined groove, the front portion declivent, much the narrower, and bearing three obtuse tubercles in front of which is a second narrow less distinct groove or furrow; hind portion strongly convex, not declivent, much less uneven; scutellum as in *Oncozygia*; osteole in the form of a short tube, not reaching middle of its supporting plate, the latter with numerous short ridges on its basal half.

Four species are known from the eastern United States.

KEY TO SPECIES OF PODOPS.

- a.* Tooth or projection near humeral angle of pronotum very prominent, subcylindrical, surpassing the humerus by a distance equal to length of eye, its apex and front edge curved; margin of pronotum in front of humeral tooth deeply sinuate or concave.
- b.* Lobe or tooth at front angle of pronotum very large, surpassing the eye by one-third or more of its length, its apex obtuse; beak reaching or slightly surpassing hind coxae, its second and third joints subequal, each one-half longer than fourth; femora wholly piceous-black; length 7—9 mm. 17. DUBIUS.
- bb.* Tooth at front angle of pronotum much smaller, not surpassing eye, its apex subacute; beak scarcely reaching middle coxae, its second joint nearly as long as third and fourth united; femora annulated with paler; much smaller, not over 5.5 mm.
- 18. PENINSULARIS.
- aa.* Tooth near humeral angle of pronotum much less prominent, but slightly surpassing the humerus, subtriangular, its apex obtuse or subacute; margin of pronotum in front of tooth feebly sinuate or straight.
- c.* Larger, 6—6.5 mm.; middle of abdomen sparsely irregularly punctate; margin of pronotum between apical and humeral projections distinctly not deeply sinuate; outer apical angles of male genital plate produced and visible from above beyond the apex of scutellum. 19. CINCTIPES.
- cc.* Smaller, not over 5.5 mm.; abdomen deeply and uniformly punctate throughout; margin of pronotum between the projections straight; outer apical angles of male genital plate short, obtuse, not visible from above. 20. PARVULUS.

17 (73). *PODOPS DUBIUS* (Palisot de Beauvois), 1805, 33.

Oblong-oval, large for the genus. Dark reddish- or grayish-brown, tinged with piceous; antennae reddish brown, the terminal joint piceous;

tibiae piceous, paler towards tips; beak, except tip, and tarsi pale dull yellow. Cheeks slightly exceeding tylus, the latter swollen and prominent its full length. Third joint of antennae one-fourth longer than

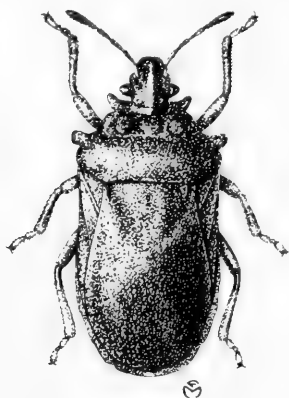


Fig. 11. X 6. (Original).

second. Pronotum with median transverse groove distinct, the tubercles in front of it prominent; the humeral and apical teeth of nearly similar form and subequal in length, both being directed outward and a little forward, the side margin between them deeply sinuate; disk of hind portion of pronotum strongly convex, coarsely and rather thickly punctate. Scutellum more finely punctate, and with a vague, rather wide oblique impression extending backward from each side of base and another each side behind the middle. Under surface sparsely and coarsely punctate. Male genital plate with apical angles rather strongly produced, pale at tip, visible from above. Length, 7—9 mm.; width, 4—4.5 mm. (Fig. 11).

Dunedin, Lakeland and R. P. Park, Fla., Dec. 15—March 25. Taken also by Davis at Everglade in May, and recorded from Massachusetts, New York, New Jersey, Virginia and Texas. An introduced West Indian species originally described from St. Domingo. My Florida specimens are all females and were taken from the axils of the leaves of a tall sedge growing along the borders of lakes, or by beating in dense hammocks. The large size, longer beak, longer third joint of antennae and prominent projections of pronotum are the main characters separating *dubius* from our other species.

18 (—). *PODOPS PENINSULARIS* Blatchley, 1924, 87.

Oblong-oval, small for the genus. Above dull grayish-brown, tinged with fuscous; head and front portion of pronotum thinly clothed with prostrate yellow pubescence; punctures of pronotum and scutellum each enclosing a minute yellow scale; first four joints of antennae reddish-brown, tinged with fuscous, last joint piceous, pubescent; under surface uniform piceous, the punctures each with a yellow prostrate scale-like hair; legs fuscous or piceous, annulate with dull yellow. Head as in *dubius*, the cheeks just equalling or scarcely exceeding the tylus, the convex portion of the latter shorter. Joints 2—4 of antennae subequal, fifth fusiform, longer and stouter. Pronotum with median transverse groove less distinct than in *dubius*, the disk behind it strongly convex, rather coarsely and thickly punctate, the tooth or projection of front angles much smaller than in *dubius*, not exceeding the eye, subtriangular,

its tip subacute; sinus in front of humeral projection less deep. Scutellum much as in *dubius*, the posterior impression scarcely evident. Abdomen much more thickly and finely punctate. Male genital segment semicircular, with a deep curved median impression, the basal portion thickly coarsely punctate, the apical one broadly and deeply concave with slightly projecting apical angles. Length 5—5.5 mm.; width, 3.2—3.5 mm.

Dunedin and R. P. Park, Fla. A dozen or so specimens taken near Dunedin, Dec. 24—April 16, from beneath boards and amongst grass roots on the margins of ponds, or on the tall dead grasses growing near by. Two at R. P. Park in April from muck in everglades. Our smallest species, resembling a miniature *dubius* but very distinct by the characters given in key and descriptions.

19 (74). *PODOPS CINCTIPES* (Say), 1828, pl. 43; I, 94.

Oblong-oval, size medium for the genus. Dull grayish-brown to fuscous; antennae reddish-brown, the terminal joint fuscous; beak and legs fuscous, annulate and spotted with dull yellow. Head as in *dubius*, the tylus less elevated and distinctly surpassed by cheeks. Pronotum with median transverse groove less impressed, the tubercles in front of it less prominent, the middle one often subobsolete; projections of front and hind angles much smaller, triangular, the front one acute, the margin between them sinuate, but much less deeply so than in either of the two preceding. Under surface thickly and finely punctate along the sides, the middle of abdomen more sparsely and coarsely so. Other characters as given in key. Length 6—6.5 mm.; width, 4.3—4.7 mm.

Frequent throughout Indiana, much more so in the northern counties. Feb. 14—Oct. 9. Like the other species it occurs on subaquatic vegetation and hibernates beneath cover close to water. Ranges from Quebec and New England west to Minnesota and Nebraska, south to New Jersey and District of Columbia. Hart (1919, 172) states that in Illinois it "seems to prefer sandy land, and often occurs in driftwood collections. The adults are found in all sections of the State and throughout the year except in April and the early part of May."

20 (75). *PODOPS PARVULUS* Van Duzee, 1904, 22.

Oblong-oval, subdepressed. Above dull brownish-yellow, tinged with fuscous; antennae reddish-brown, the last joint darker; beneath uniform piceous; beak and legs fuscous, annulate with paler. Head much as in *cinctipes*, the cheeks a little wider, more flattened and more concave, the tylus less convex. Pronotum with front portion wider, less declivent,

tooth at front angle very small, awl-shaped, the one at humeral angle small, subtriangular, its apex acute, produced slightly backward and downward. Under surface closely and nearly regularly punctate throughout. Other characters as in key. Length 5—5.5; width, 3.5—3.8 mm.

Pine, Lake Co., Ind., May 20 (*Gerhard*). Northern Illinois (*Hart*). Ranges from Quebec and New England to Kansas and Colorado; not known south of New Jersey.

Family III. CORIMELÆNIDÆ Uhler, 1872a, 471.

THE NEGRO BUGS.

Small oval, convex, usually black bugs, having the head subtriangular, broader than long, more or less declivent, its apex rounded; cheeks, in our species, not exceeding tylus; antennae shorter than head and thorax, 5-jointed; beak slender, 4-jointed; pronotum subquadrangular, broader than long, its hind angles not prominent; scutellum very broad, strongly convex, longer than the corium, covering almost the entire abdomen, its tip very broadly rounded; frena very short; corium largely membranous, the exposed opaque part very narrow; first ventral very narrow, almost or wholly covered by the metasternum; meso- and metapleura opaque, rugose, the osteolar opening extended as a tapering canal; tibiae armed with slender spines; front ones not fossorial; tarsi 3-jointed.

Malloch (1919, 207) has shown that *Thyreocoris scarabæoides* L., the European genotype of *Thyreocoris*, the genus of the family under which Van Duzee places all our species, differs from our American species in having the cheeks contiguous in front of and concealing the tip of tylus, and the chitinized part of the wing broad from base to apex, whereas in our forms it is very much narrowed. Our North American species are therefore placed in three genera, all of which occur in the eastern states. Since the genus *Corimelæna* White (1839) is the oldest of these, it serves as the basis for the family name as above used.

The family has by Van Duzee and recent authors been combined with the Cydnidae, but the characters separating the two are sharper and more distinct than those separating the Scutelleridae and Pentatomidae. Moreover the habits of the two groups are very different, the Corimelænids, occurring

mainly on grasses, weeds and low shrubs along the edges of cultivated fields and roadsides, whereas the Cydnids are mostly terrestrial and ammophilous, burrowing insects found mainly in the vicinity of water. I have therefore followed Uhler and Banks in retaining the Corimelænidæ as a separate family.

Several species of these small black bugs are very plentiful and sometimes injurious to vegetation. They resemble certain beetles, especially some of the Histeridae, in form and color and have been sent to me on a number of occasions as Coleoptera for naming. The principal literature treating of our eastern species is by Dallas, 1851; Uhler, 1876; Van Duzee, 1904, 1923; Malloch, 1919; Hussey, 1925.

KEY TO GENERA OF CORIMELÆNIDÆ.

- a.* Side margins of pronotum and abdomen ciliate with long hairs; hind tibiae with long spines on five surfaces. I. CYDNOIDES, p. 59.
- aa.* Side margins of body not ciliate.
 - b.* Costal margin of corium wholly black, bordered within by a distinct groove; femora armed beneath with short, stout, preapical spines; hind tibiae with long spines on five surfaces. II. GALGUPHA, p. 61.
 - bb.* Costal margin usually in part ivory-white, without an inner groove; femora with only a few fine bristles; hind tibiae with short, widely separated spines on four surfaces. III. CORIMELÆNA, p. 65.

I. CYDNOIDES Malloch, 1919, 207.

Small hemispherical or oval convex species, possessing the characters of the family as above given and having the margins of the body ciliate; femora without spines, but bearing several bristly hairs; elytra relatively broad, their tips oblique, obtuse; hind tibiae with five rows of long spines. Four of the 22 recorded North American species of the family belong to this genus, two of them occurring in the eastern states, the other two, *sayi* Van D. and *obtusa* Uhler, in the southwest.

KEY TO EASTERN SPECIES OF CYDNOIDES.

- a.* Color purplish-black without white markings; form rounded. 21. CILIATUS.
 - aa.* Color shining black, the base of corium and clavus with a large ivory-white spot; form oval. 22. RENORMATUS.
- 21 (32). CYDNOIDES CILIATUS (Uhler), 1863, 156.

Rounded or hemispherical, convex above, subdepressed beneath. Above black, faintly bronzed or tinged with purple, subopaque; antennae

reddish-brown, the outer two joints darker; abdomen and propleura black, shining; legs dark reddish-brown, the tarsi paler. Head declivent, broader than long, depressed along the tylus, the cheeks finely, densely confluent punctate. Front half of pronotum with punctures at middle fine and rather sparse, on sides coarser and very dense; hind portion of pronotum and disk of scutellum densely aciculate punctate. Elytra finely and rather sparsely punctate. Abdomen nearly smooth at middle, the sides finely, not closely punctate. Osteolar area opaque, finely transversely rugose. Length, 4—5.2 mm.; width, 3—3.5 mm.

Crawford Co., Ind., July 9 (*W. S. B.*); swept from *Cassia marilandica* L. Topeka and Meredosia, Ill., June 7—Aug. 17 (*Hart*). Ranges from southern Indiana and Illinois west to the Pacific and south to Florida and Arizona; occurring mainly on *Cassia*. In Florida it has been taken only at Lake Worth by Mrs. Slosson and Ocean Beach by Davis. Hart (1919, 208) says that this "is in Illinois a characteristic and very common species of the sand areas. In August it was often common on the stems of various plants, but its most curious habit was that of burrowing in the loose drifting sand about the roots of tufts of grass. Where there was no sign of individuals above ground, a single turn of the finger in the sand around a grass plant would frequently bring two or three to the surface. Nymphs were taken at Havana Sept. 20." Van Duzee (1904, 6) says that it is "quite distinctly transversely wrinkled on the disk of pronotum and scutellum." Uhler does not mention such wrinkles and none of the specimens at hand show them, all having the punctures dense and aciculate, the punctures being connected by very fine lengthwise sulci, each of which has a minute ridge each side, thus giving a peculiar subopaque finish to the surface.

22 (40). CYDNOIDES RENORMATUS (Uhler), 1895, 11.

Oval, subdepressed. Black, shining, base of both corium and clavus ivory-white, almost impunctate. Head rather finely, unevenly, rugosely punctate. Pronotum twice as wide as long, feebly convex; disk with a vague premedian transverse groove marked with fine impressed lines and on sides with coarse punctures. Scutellum finely and sparsely punctate, not reaching tip of abdomen, apex bluntly rounded, disk with a wide punctate depression each side. Length 3.5—3.8 mm.

Denver, Colo., July (*Barber*). One specimen in the Urbana collection from northern Illinois. Known only from these two states.

II. GALGUPHA Amyot & Serville, 1843, 68.

Small oval convex species having the head subtriangular, broader than long, its apex bluntly rounded; cheeks equalling or slightly shorter than tylus; beak reaching or surpassing middle coxae; antennae rather stout, second joint less than

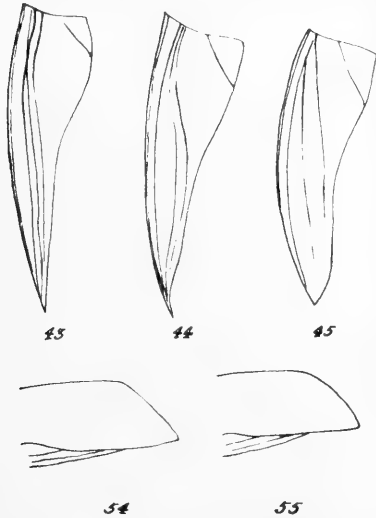


Fig. 12. Showing venation of corium and form of scutellum in *Galgupha*; 43, corium of *aterrima*; 44, of *nitiduloides*; 45, of *nigra*; 54, scutellum of *aterrima*; 55, of *nitiduloides*.
(After Hart & Malloch).

one-third the length of third, 3—5 subequal; pronotum quadrangular, nearly twice as wide as long, its side margins entire, not ciliate; scutellum very large, covering almost entire abdomen, its apex broadly rounded; elytra with corium very narrow, its apex acute; connexivum not exposed; area of meso- and metapleura surrounding the osteole opaque, transversely rugose; hind tibiae armed with five rows of strong spines and with a linear ridge or carina on under or posterior surface. Genital plate of male almost concealed by the large sixth ventral, its hind margin subtruncate, sometimes slightly

emarginate. Five of our eastern species belong to this genus.

KEY TO EASTERN SPECIES OF GALGUPHA.

- a. Surface highly polished, punctures of upper surface, except on sides of scutellum, very few; corium without a distinct ridge inside the costal groove; pronotum and scutellum evenly convex, their bases at same level; larger, length, 5—6 mm. 23. ATRA.
- aa. Surface above distinctly punctate; corium with a distinct ridge inside the costal groove; pronotum higher than scutellum, their bases forming a transverse groove; smaller, not over 4.5 mm.
- b. Form more oval, slightly narrowed behind; surface shining black, distinctly not closely punctate.
- c. Scutellum not abruptly declivous at apical third (fig. 12, 55); venation of corium as in fig. 12, 44; fore femora with median spine on lower front margin distinctly longer than the other two.
- d. Joint 3 of antennae two and one-half times as long as 2; side margins of head reflexed; jugae with oblique impressions.

24. NITIDULOIDES.

dd. Joint 3 of antennae less than twice as long as 2; side margins of head thickened, but not reflexed; jugae without oblique impressions. 25. OVALIS.

cc. Scutellum rather abruptly declivent at apical third (fig. 12, 54); venation of corium as in fig. 12, 43; fore femora with first and second spines subequal in length. 26. ATERRIMA.

bb. Form rounded or short oval, not narrowed behind; surface above densely punctured, faintly tinged with brassy; venation of corium as in fig. 12, 45. 27. NIGRA.

23 (27). *GALGUPHA ATRA* Amyot & Serville, 1843, 68.

Broadly oval, convex above, very little narrowed behind. Black, shining; antennae reddish-brown, the last two joints darker; beak almost reaching hind coxae, dark reddish-brown, the tip black; tarsi pale. Osteolar area opaque, finely transversely rugose. Head much wider than long, its apex obtuse; cheeks very finely, not closely punctate. Pronotum nearly twice as wide as long, side margins curved, rather broadly reflexed; disk minutely, obsoletely punctate, more evidently so in a wide vague depression behind the front angles. Scutellum almost smooth at middle, rather closely and finely aciculate punctate along the sides. Corium rather wide, acute at apex, finely and sparsely punctate. Abdomen finely and closely aciculate-punctate along the sides, the middle almost smooth; propleura minutely punctate. Fore femora with three short subequal spines. Genital plate of male about three times as wide as long, finely and sparsely punctate, its hind margin reflexed. Length, 5–6 mm.; width, 3.2–4 mm.

Frequent throughout Indiana, May 12—Dec. 10. Occurs in summer on grass and weeds in moist soil along roadsides, forests and borders of streams; in autumn beneath leaves and fallen masses of blue-grass. Hibernates singly beneath logs, root leaves of mullein and other convenient hiding places. Ormond, Sanford, R. P. Park and Dunedin, Fla., March 21–April 6. Frequent about Dunedin in late March on weeds in low damp grounds. Recorded from several other stations by Barber and Van Duzee and probably occurs throughout the State.

The known range of this, our largest and most shining species, extends from Quebec and New England west to Manitoba and Colorado, and south and southwest to Florida, Texas and Mexico. It has been recorded by various authors as *C. unicolor* Pal. Beauv., but Uhler (1878, 366) states that comparisons with the Beauvois types made for him by Signoret and Scudder showed it to be different. Stoner found it abundant in late June at Ft. Madison, Iowa, on barley and *Plantago aristata* Michx.

24 (28). *GALGUPHA NITIDULOIDES* (Wolff), 1802, 98.

More narrowly oval than *atra*, feebly but obviously narrowed behind. Black, shining; antennae reddish-brown, darker toward apex; tarsi pale. Head less broad, the apex less obtuse; cheeks densely, rather coarsely punctate. Beak reaching middle coxae. Pronotum and scutellum finely rather evenly and shallowly punctate, more densely, somewhat aciculate so on sides. Corium narrower and more acutely pointed than in *atra*, its outer margin bordered internally by a distinct ridge. Abdomen finely punctate throughout, much more densely so on sides; propleura smooth; osteolar area with the usual opaque rugose surface. Genital plate of male more than three times as wide as long, its hind margin subtruncate. Length, 4—4.5 mm.; width, 2.7—3.5 mm.

Lake, Marion, Vigo, Knox and Perry counties, Ind., Feb. 28—July 4; probably occurs throughout the State, but apparently less common than *atra*. Agricultural College, Miss. (*Wcdd*). Occurs on vegetation, especially that of hazel and milkweed, along the edges of woodland and cultivated fields. Hibernates as imago. Ranges from Ontario and New England west to Colorado and south to North Carolina, Texas and Guatemala. Not as yet recognized from Florida. Van Duzee (1894, 169) reported it as rare about Buffalo, N. Y., and (1904, 5) as "abundant on *Plantago purshii* R. & S. at Ft. Collins, Colo. These were resting on the flower spikes in all stages of development, and perhaps one-half of them were covered with a dusky 'bloom' which gave them a dull bluish-black appearance. This is likely connected with the breeding season as is the 'bloom' often found on certain species of *Euschistus*." The *Thyreocoris histeroides* Say (I, 311) is a synonym of this species.

Zimmer (1911, 245) distinguishes *nitiduloides* from *atra* mainly by the former having:

"A deeply impressed line arising between the subcostal and cubital nervures at their base and running parallel to the former, leaving a distinct ridge parallel to it which extends the greater part of the length of the corium. This shows more plainly when the insect is viewed directly from above. In *atra* there may be a somewhat raised portion just within the subcostal nervure, but it is not bounded inwardly by a distinct impressed line." In differentiating it from *C. nigra* he says: "There is also in *nitiduloides* a finely impressed line just exterior and parallel to the cubital nervure and reaching nearly or quite to the tip of the corium, making the nervure appear double, while in *nigra* this line is absent, though a broken row of rather coarse punctures may occupy nearly the same position and the suture itself be lost in the punctate groove."

25 (—). *GALGUPHA OVALIS* Hussey, 1925, 62.

Broadly oval, slightly obovate. Black, strongly shining; head, scutellum and elytra tinged with bronze; antennae and tarsi reddish-brown. Upper surface finely and sparsely punctate, more vaguely so on disks of pronotum and scutellum. Head across the eyes twice as wide as long, flattened each side of apical third of tylus; beak reaching middle coxae. Pronotum almost twice as wide as long, sides strongly deflexed, their margins evenly rounded. Corium as in *nitiduloides*, the impression shallower and more prolonged backward. Ventrals coarsely, unevenly and shallowly punctate. Sixth ventral of male very deep at center, its inner apical angles depressed next to the genital, the latter four times as wide as long. Other characters as in key. Length, 4.5 mm.

Macon, Ga., April 6; type and paratype (*Hussey*). Known only from that, the type locality. Allied to *nitiduloides*, "but proportionally broader at humeral angles and more distinctly narrowed behind, third antennal shorter, oblique impressions on juga wanting, margins of head not reflexed and sixth ventral of male very different." (*Hussey*).

26 (—). *GALGUPHA ATERRIMA* Malloch, 1919, 210.

Closely allied to *nitiduloides* and distinguished mainly by the characters given in key. Form more oblong-oval. Color the same. Apex of head more distinctly margined, the margin reflexed. Genital plate of male with hind margin more concave and rather strongly reflexed. Length, 4.2—4.7 mm.; width, 3—3.2 mm.

Knox Co., Ind., Sept. 12 (*H. S. B.*). Dongola, Ill., May 10. Recorded by Malloch from numerous stations in Illinois, April 12—June 14; also from Beltsville, Md. He states: "This is very probably the form referred to by Van Duzee (1904, 5) as *nitiduloides* var." The specimens of Van Duzee were from Buffalo, N. Y., and New Jersey.

27 (31). *GALGUPHA NIGRA* (Dallas), 1851, 57.

Rounded or broadly oval, convex. Black with a slight brassy tinge, antennae reddish-brown to fuscous; legs dark reddish-brown to piceous, tarsi paler. Head one-half wider across the eyes than long, its margins reflexed, not sinuate; cheeks finely, densely, confluent punctate. Pronotum two-thirds wider than long, sides broadly rounded, disk finely, densely, aciculate punctate, giving it a subopaque, shagreened appearance. Scutellum with disk more finely, less closely punctate and with a rather deep coarsely punctate depression behind each basal angle, the sides and apical third strongly declivent and more densely punctate. Elytra sparsely and finely punctate, the corium with external ridge

much as in *nitiduloides*. Sculpture of under surface as there, the propleura minutely granulate. Front femora with two short spines on apical third of lower surface. Length, 3—4.2 mm.; width, 3—3.5 mm.

Lake, Starke, Putnam and Vigo counties, Ind., scarce, March 20—June 26. Hibernates beneath logs and in spring and summer found on weeds in the vicinity of water. Ranges from Ontario and Indiana to Colorado and Arizona. The types of Dallas were from Hudson's Bay. Malloch (1919, 210) states that it is found throughout Illinois, but not common, July 9-Oct. 17.

In form and sculpture *nigra* more closely resembles *C. ciliatus* than any of our other species. The bases of pronotum and scutellum are not transversely wrinkled as stated by Van Duzee (1904, 6), but aciculate punctate and the surface has a faint but evident brassy tinge.

III. CORIMELÆNA White, 1839, 539.

Differs from *Galgutha* mainly by the characters given in the generic key. With the exception of *anthracina* our species have the costal margin of elytra in part or wholly ivory-white. The cheeks are usually slightly shorter than tylus; pronotum impressed on sides near hind angles, its margin at this point nearly vertical; scutellum with an impressed line on basal half near the lateral margins; hind tibiae with four rows of short, widely placed spines and without a longitudinal carina.

Six species are recognized from the eastern United States.

KEY TO EASTERN SPECIES OF CORIMELÆNA.

- a.* Elytra wholly black; reflexed narrow side margins of pronotum obsolete before reaching the polished nodulose hind angles.
 - 28. ANTHRACINA.
- aa.* Elytra with yellowish-white markings along the costal margins, these sometimes very short; reflexed side margins of pronotum continued around the nodulose hind angles.
 - b.* Hind tibiae with three or four spines on posterior dorsal face, the basal one very small.
 - c.* Pale border of elytra not widened near base.
 - d.* Larger, 3.5—4 mm. 29. LATERALIS.
 - dd.* Smaller, less than 2.5 mm. 30. MARGINELLA.
 - cc.* Pale border of elytra widened near base, crossing the sub-costal nervure onto corium; horny costal margin of elytra with apex obtusely rounded; length, 2.5—3 mm. 31. PULICARIA.

- bb.* Hind tibiae without spines on posterior dorsal face, rarely with minute setulae present; horny costal margin of elytra acute at apex.
- e.* Smaller, length less than 2.7 mm.; genital plate of male wholly black. 32. HARTI.
- ee.* Larger, length, 3—4 mm.; genital plate of male yellowish along the upper margin; hind tibiae with one or two weak setulae on the posterior dorsal face. 33. AGRELLA.

28 (29). *CORIMELÆNA ANTHRACINA* Uhler, 1876, 270.

Broadly ovate. Black, strongly shining; antennae reddish-brown; legs piceous, the tarsi paler. Head rather coarsely, densely, confluent punctate. Pronotum nearly twice as wide at base as long; disk rather strongly convex, finely, evenly punctate, more densely so on sides; nodules above hind angles smooth, the side margins reaching their front. Scutellum more finely and sparsely punctate, the sides at base more coarsely so. Other characters as in key. Length, 4.5—4.8 mm.

Dilley, Ore., (*Barber*). Malloch (1919, 213) records a specimen from Lake Superior in the Urbana collection. Ranges from there and Nebraska west to the Pacific.

29 (34). *CORIMELÆNA LATERALIS* (Fabricius), 1803, 142.

Broadly oval, convex, but slightly narrowed behind. Black, shining; costal border of elytra edged with yellowish-white, usually for nearly its entire length, but often only near apex; ends of sixth ventral and, in female, of genital segment, similarly edged with ivory-white; antennae reddish-brown, the apical joints darker; beak dark reddish-brown; tarsi paler. Head triangular, one-half wider than long, apex obtuse; cheeks scarcely margined, finely, densely and deeply punctate, slightly shorter than tylus. Pronotum sparsely, unevenly, finely punctate on disk, the sides densely and more coarsely so, the base almost smooth; humeri prominent, tubercular, with a vague depression before and a deeper one behind their base. Scutellum with a faint wide shallow impression behind each basal angle, this and the sides rather coarsely and closely punctate, disk finely, very sparsely and shallowly punctate. Corium narrow, finely punctate, its apex acute. Abdomen finely, densely striate-punctate on sides, much more sparsely punctate at middle; prothoracic pleura coarsely and closely punctate. Spines of all the tibiae short and weak. Basal genital plates of female as broad as long. Length, 3.5—4.2 mm.; width, 2.7—3 mm.

Marion, Jennings and Crawford counties, Ind., scarce. May 6—July 30. Occurs on weeds and tall grass in the vicinity of water. Dunedin, Ft. Myers and Chokoloskee, Fla., Nov. 22—April 27; occurs in numbers throughout that State. About Dunedin it is found in spring on ferns in dense hammocks and

on the leaves of semiaquatic plants along the margins of ponds. The known range of the species is a wide one, extending from Massachusetts west to Nebraska and south to Florida, Texas and Mexico. It is apparently more common in the south, the northern records mostly reporting it as rather scarce. Uhler (1876, 271) says "it abounds on the prairies of Illinois," while Malloch (1919, 213) reports it as widely distributed, but not abundant in that State. Parshley records it from but four stations in New England. Stoner (1920, 28) says it is nowhere common in Iowa. The *C. gilletti* Van D. (1904, 8) is a synonym. From our other species with white markings on sides of elytra it is easily distinguished by its much larger size. These markings, however, vary to some extent, being often interrupted at middle and sometimes present only near apex, but never widened at base or crossing the subcostal nervure onto the corium as in *pulicaria*.

30 (—). *CORIMELÆNA MARGINELLA* Dallas, 1851, 59.

Very small, broadly oval, convex. Black, shining, often with a slight brassy lustre, the costal border of elytra with an entire calloused yellow, orange-red or ivory-white line which is not widened at base; margins of sixth ventral and, in females, of genital plate, orange-red; antennae dull yellow, the terminal joints usually darker; femora black, tibiae piceous, tarsi paler. Head broader across the eyes than long; tylus slightly longer than cheeks, its tip yellowish, feebly thickened and upturned to resemble a small tubercle; cheeks slightly sinuate in front of eyes, rather coarsely and very densely punctate; beak reaching base of second ventral. Pronotum finely and densely striate-punctate, the basal portion elevated above the plane of the scutellum and more shallowly, less roughly punctate; humeri subtuberculate, almost smooth at apex. Scutellum with disk very finely, sparsely and vaguely punctate, the sides more coarsely, deeply and densely so. Corium very small and narrow, acute at apex, with a few minute punctures. Abdomen with sides finely and closely punctate, the middle almost smooth. Length, 2.2–2.7 mm.; width, 1.3–1.7 mm.

Perry County, Ind., May 16 (*W. S. B.*). Lakehurst, N. J., May 29 (*Davis*). Lakeland, Dunedin, Sarasota, Ft. Myers, R. P. Park and Key West, Fla., Nov. 21–May 7. The single Indiana specimen was taken while sweeping herbage along the banks of the Ohio River and well represents the character of the Austroriparian fauna which extends northward into southern Indiana. In Florida this is by far the most common and widely distributed member of the family and has been recorded from

many stations as *pulicaria* (Germ.) which species, as differentiated below, appears to be very scarce in that state. About Dunedin *marginella* occurs on the foliage and flowers of various plants, both in low mucky and high sandy soils, being especially frequent in early spring on the flowers of the dwarf papaw, *Asimina parviflora* Michx., while at Ft. Myers both it and *C. lateralis* were taken in some numbers while sifting the debris of subaquatic plants along the margins of an extinct wet weather pond.

Dallas (loc. cit.) records his types of *marginella* from "New York: presented by Edward Doubleday," and not from Hudson's Bay as erroneously stated by Van Duzee (1904, 9). Doubleday collected both in Florida and New York and it is possible that the types of *marginella* were really from the former state if not from southern New York. The *C. nanella* McAtee, described by Malloch (1919, 215) from Virginia and Maryland, is a synonym of *marginella*. As there is so much confusion in the synonymy, the range of this small southern form is difficult to state. Since it occurs as far north as southern Indiana and New Jersey, it probably takes the place of *pulicaria* in most of the southern states and has been recorded by Distant from Mexico.²²

31 (37). CORIMELÆNA PULICARIA (Germar), 1839, 39.

Oval, convex, widest across the humeri. Black, shining; costal margin of elytra ivory-white or orange-red, this pale color widened at base, crossing the subcostal nervure and covering the apical half or more of corium; ends of fifth and sixth ventrals and, in female, of genital plate, yellow or orange-red; antennae reddish-brown, the terminal joints darker; femora piceous, knees and tibiae reddish-brown, tarsi paler. Head as broad between the eyes as long, its apex less produced and more obtuse than in *marginella*; cheeks more finely, less closely punctate than there, the tip of tylus slightly recurved, not tuberculate; beak reaching hind coxae. Disk of pronotum finely and shallowly punctate, more closely so in front and on sides than on basal portion, the latter elevated above the base



Fig. 13, X 8.
(After Hart).

²²Uhler (1863, 155) described *Corimelæna minuta* from Cuba, and there is no character in his description which distinguishes it from *marginella* as here recognized. Van Duzee (1904, 76) records *minuta* from Jacksonville, Fla., and, in his catalogue, from Florida and Texas. Barber (Ms.) states that *minuta* differs from *marginella* by being "very closely and coarsely punctate," and states that Van Duzee was probably in error in regard to its occurrence in the two States mentioned. Since Van Duzee in his 1923 paper does not recognize it from this country, I have not included it in the keys.

of scutellum, giving the appearance of a groove between them; humeri prominent, rounded, almost smooth. Scutellum finely, shallowly punctate throughout; sparsely so on disk, more densely so on sides, the impressions at basal angles with coarser punctures. Elytra with inner black portion sparsely punctate. Abdomen densely and finely punctate on sides, the middle nearly smooth; osteolar area, as in our other species, opaque and finely transversely rugose. Prothoracic pleura finely and closely punctate. Length, 2.7—3.2 mm.; width, 2—2.2 mm. (Fig. 13).

Common throughout Indiana, Feb. 11—Nov. 17. Dunedin, Fla., Nov. 29—Jan. 11 (*W. S. B.*). Agricultural College, Miss. (*Wcd*). In Indiana it occurs in spring and summer on flowers of various kinds, especially those of the wild plum and Jersey tea; hibernates beneath logs, mullein and other cover, and early in April often common beneath dead leaves along fence rows and borders of woods. Ranges from Quebec and New England west to British Columbia and Colorado, and south to Mississippi, Florida and Texas. Apparently common everywhere throughout most of its range and at times quite injurious to vegetation. Forbes (1905, 115) says that:

“In Illinois it is often abundant during the greater part of the summer on a great variety of weeds and cultivated plants, the juices of which it sucks through its tubular beak to the occasional serious injury of the crop. The favorite food plants of the species seem to be Jersey tea, *Ceanothus americana* L., Spanish needles, and a small door-yard weed, *Veronica peregrina* L. It is probable that the insect breeds principally on these plants. Wheat, blue-grass, strawberry and celery have been injured by them, and they often occur on cultivated berries to which they give a disagreeable taste. The species is single-brooded, the adults hibernating and appearing in early spring and laying eggs in May and June. The young which hatch from these eggs rarely fail to reach maturity by the early part of July, after which the adult insect is common until fall.”

Stoner (1920, 28) states that near Ames, Iowa:

“It was found plentiful in June and July on potatoes, and that an experiment with 20 of the bugs kept on potato plants in an insectary showed that ‘the feeding punctures made by the insects cause the leaves to wilt and droop. The bugs seem to feed more upon the tender stems than upon the leaves of the plants. Near Iowa City, on May 22, great numbers of this species were swept from smart-weed and other low weeds growing in an unplowed strip running through the middle of a field that had been plowed a short time before. Hundreds of specimens could have been taken with a sweep-net in a few minutes. At Osage the species was swept from tansy on Aug. 12. In almost every locality

visited it was taken from red clover, and from fields grown up in red clover, timothy and blue-grass."

From both *lateralis* and *marginella*, *pulicaria* is easily distinguished by having the corium in great part white, and from *lateralis* also by its much smaller size. The shorter, more obtuse head, lack of tubercle on tip of tylus, less densely punctate cheeks, shorter beak and slightly larger size are other characters separating it from the southern species, *marginella*.

32 (—). CORIMELÆNA HARTI Malloch, 1919, 215.

Broadly oval. Black, shining, with a slight brassy tinge; costal border of elytra and outer margins of fifth and sixth ventrals ivory-white; female with apex of last dorsal also ivory-white; antennae dull yellow; femora black, tibiae and tarsi paler. Head broader than long, finely and rather closely punctate. Pronotum finely and densely punctate, more so on sides where the punctures are sub-strigose or aciculate. Scutellum as wide as long, the apex broadly rounded, its disk finely, rather sparsely punctate with sides more closely and coarsely so. Genital plate of male densely punctate, its upper margin bisinuate. Length, 2.5 mm.

Plummer's Island, Md., Oct. 6 (*McAtee*). Described from Makanda, Ill., and recorded also from Virginia and Georgia. Very close to *marginella* Dall., but lacking the hind tibial spines and with head less densely punctate.

33 (—). CORIMELÆNA AGRELLA McAtee, (Hart & Malloch, 1919, 216).

Broadly oval, convex. Black, shining, with a greenish reflection; costal margin of elytra and outer margin of sixth ventral ivory-white; antennae and tarsi pale brownish-yellow, femora and tibiae piceous-brown. Resembles *C. lateralis* closely in structure and sculpture, but body thicker throughout, more broadly rounded behind. Pronotum with transverse depression more pronounced and humeral angles more convex. Length, 3—4 mm.

Plummer's Island, Md., April 26 (*McAtee*). That is the type locality but it is known also from Virginia and Kentucky. The more convex form, with body more broadly rounded behind and the paler antennae, distinguish *agrella* from *lateralis* with which it is closely allied.

Family IV. CYDNIDAE Billberg, 1820, 70.

THE GROUND OR BURROWER BUGS.

Small or medium sized black or brown, oval or oblong sub-depressed species having the head feebly declivent, clypeate

or semicircular; cheeks equalling or slightly surpassing tylus; antennae 5-jointed, inserted under the sides of head; beak 4-jointed; pronotum oval or subquadrangular, its front portion not or feebly declivent; scutellum broad, triangular, tapering behind, its tip reaching only to base of elytral membrane, frena reaching beyond its middle; elytra widely exposed, the corium broad, its apex truncate; membrane surpassing abdomen, its veins simple, radiating from the base; osteolar area usually opaque, smooth or finely granulate; tibiae armed with strong spines, the front ones often widened and fossorial; tarsi 3-jointed.

As already noted, the members of this family are mainly terrestrial forms which occur in the vicinity of water, where they burrow in the sand or mold about the roots of tufts of grass and other plants or are found beneath stones or other cover, often in the nests of ants. The principal literature available treating of our species is that of Uhler, 1877; Signoret, 1881—1884; Hart and Malloch, 1919, and Stoner, 1920. The family is poorly represented in North America, but 32 species belonging to eleven genera being there known. Of these 19 species representing nine genera occur in the eastern states.

KEY TO EASTERN GENERA OF CYDNIDÆ.

- a. Margins of head and pronotum armed with bristly hairs or short spines; tibiae closely set with stout spines; front tibiae more or less compressed; tarsi slender, filiform. (Subfamily *Cydninæ*).
- b. Scutellum with apex rounded, the coria not meeting behind its tip; form oval; osteolar canal not long, slender or reaching nearly to end of metasternal plate (except in *Macroporus*).
- c. Hind tibiae strongly flattened and curved, their lower face with numerous long bristles, the upper one with many stout spines and bristles; osteolar opening with only a small external auricle; length, 6.5—9 mm. I. CYRTOMENUS, p. 72.
- cc. Hind tibiae slender, nearly straight, uniformly spined on both upper and lower faces.
- d. Head without a deep groove beset with numerous irregular bristles and teeth just within the reflexed margin.
- e. Pronotum with a distinct impressed sinuate line just behind its front margin; length, 5.5—8 mm. II. PANGÆUS, p. 73.
- ee. Pronotum without an impressed line behind the front margin.
- f. Smaller, length less than 4.3 mm.; osteolar tube slender, two-thirds the length of metasternal plate, prolonged beyond the opening as a curved flattened semicircular lobe; pronotum of male without a deep impunctate concavity.

III. GEOTOMUS, p. 76.

- ff.* Larger, length 5 or more mm.; osteolar opening anteapical, prolonged as a short distinct canal; pronotum of male, in our species with a broad deep impunctate concavity on middle of apical half. IV. *GEOCNETHUS*, p. 80.
- dd.* Head with a distinct transverse groove just behind the recurved margin, the groove thickly beset with irregular bristles and short spines.
- g.* Scutellum short, about as broad at base as long, its tip subacute; osteolar canal reaching almost to outer margin of metasternal plate, its tip flat, clavately rounded. V. *MACROPORUS*, p. 81.
- gg.* Scutellum longer than broad, its tip rounded; osteolar canal not more than half the length of metasternal plate.
- h.* Margins of body fringed with numerous long yellowish hairs; apex of scutellum broadly rounded; osteolar canal ending in a rounded concavity. VI. *CYDNUS*, p. 81.
- hh.* Margins of body not fringed with hairs; apex of scutellum narrowly rounded; osteolar opening not extended as a canal, but as a flattened oblique plate. VII. *ÆTHUS*, p. 83.
- bb.* Scutellum with apex mucronate, the coria meeting behind its tip; form oblong; front of head with short stout comb-like teeth; osteolar canal long, slender, reaching three-fourths or more the distance to outer margin of metasternal plate; length less than 3 mm. VIII. *AMNESTUS*, p. 85.
- aa.* Margins of head and pronotum without bristly hairs or spines; tibiae with fewer and shorter spines; front tibiae not compressed; tarsi stout, second segment more slender than basal one. (Subfamily *Sehirinæ*). IX. *SEHIRUS*, p. 89.

I. *CYRTOMENUS* Amyot & Serville, 1843, 90.

Species of medium size and oval convex form having the head broader across the eyes than long, its apex broadly rounded; cheeks broad, slightly surpassing tylus and almost contiguous in front of it, their margin reflexed not sinuate, setiferous within; eyes prominent, bluntly subconical, coarsely granulated; ocelli very large; beak slender, reaching hind coxae, the second joint longer than third, fourth shortest; antennæ short, stout, joint 2 slightly shorter and more slender than 1, 3—5 stouter, fusiform, pedunculate, each one-half longer than second; pronotum subquadrangular, somewhat narrowed in front, hind angles obtuse, front ones rounded, side margins with erect coarse bristles, nearly straight, narrowly reflexed; scutellum broad, triangular, with apex bluntly rounded; elytra broad, their tips obliquely truncate, side margins ciliate; membrane hyaline, much surpassing the abdomen; femora broad, subdepressed, beset above and beneath with

bristly hairs; hind tibiae as described in key; tarsi slender, the first joint longer than the other two united.

Two North American species are known, both neotropical, one extending north into California, the other into the eastern states.

34 (44). *CYRTOMENUS MIRABILIS* (Perty), 1834, 166.

Broadly oval, convex above and beneath. Dark chestnut-brown, shining; ocelli pale red; antennae, beak and legs brownish-yellow; abdomen dark reddish brown. Head with front margin semicircular, surface impunctate, but with numerous coarse wrinkles and a row of erect coarse bristles within the reflexed margin, these often eroded. Pronotum with a rather wide median transverse groove and a median depression near front margin, these coarsely, irregularly punctate, remainder of disk with a very few coarse punctures. Scutellum coarsely and very sparsely punctate, its sides feebly sinuate near tip; frena extending to the sinuation. Elytra with coarse punctures along the grooves, elsewhere only vaguely and shallowly punctate. Under surface impunctate, the margins of abdomen ciliate with a few long remote bristles; osteolar areas minutely granulate. Genital plate of male short, almost concealed by sixth ventral, its hind margin truncate. Length, 6.5—9 mm.; width, 4.5—5.5 mm.

Dunedin, St. Petersburg and Moore Haven, Fla., Jan. 21—June 10. Taken at electric lights and about the roots of tufts of grass and beneath cover near the margins of ponds and lakes. Recorded from numerous other Florida stations and probably occurs sparingly throughout that state. It is our largest member of the family and ranges from Staten Island, N. Y., and southern Illinois, south and west to Texas, California and Central and South America. Hart (1919, 205) records the taking of a single example, Aug. 1, at a street light in Cairo, Ill., and states that "adults and numerous nymphs were sent me from Georgia as injurious to the chufa or edible sedge-root, *Cyperus esculentus* L."

II. *PANGÆUS* Stal, 1862, 95.

Broadly oval subdepressed species of large size for the family, having the head subporrect, as wide or wider across the eyes than long, apex very broadly rounded, margin feebly recurved but without a groove thickly beset with bristles behind it; cheeks wide, flat, their margins not sinuate; ocelli small, widely separated; antennae short, not reaching hind angles of pronotum, joints 2 and 3 each slightly shorter than 4 or 5 which are subequal in length, subfusiform and stouter than 2;

beak slender, reaching or surpassing middle coxae, joints 2 and 3 subequal, 4 shorter; pronotum subquadrate, wider than long, narrowed in front, its side margins straight from base to beyond middle, thence rounded to apex, slightly reflexed, beset within by eight or more bristles; disk with a deeply impressed curved line close to front margin, the latter widely and deeply concave and sinuate; scutellum flat, triangular, its apex much narrower than that of corium, tip narrowly rounded; corium with apex straight, oblique, its outer apical angle subacute, costal margin with 3—5 coarse setae-bearing punctures; connexivum not exposed; femora armed beneath with a row of very slender erect bristle-like spines; tibiae slender, armed with several rows of rather stout, inclined bristles; hind margins of sides of ventral segments minutely serrulate; osteolar opening with a short, attenuate curved auricle, this indented behind near its tip.

Six species are recognized by Van Duzee as occurring in North America, three of which are known from the eastern states.

KEY TO EASTERN SPECIES OF PANGÆUS.

- a.* Larger, 6.5—8.5 mm.; color usually black, strongly shining.
 - b.* Second and third joints of antennae subequal; impressed line near front margin of pronotum entire. 35. *BILINEATUS*.
 - bb.* Second joint of antennae distinctly longer than third; impressed line of pronotum more or less obsolete at middle, where it is represented by coarse punctures. 36. *DISCREPANS*.
 - aa.* Smaller, not over 6 mm.; color piceous or dark reddish-brown; second antennal slightly shorter than third. 37. *UHLERI*.
- 35 (58). *PANGÆUS BILINEATUS* (Say), 1825, 315; II, 242.

Broadly oval, subdepressed. Head, pronotum, scutellum and under surface deep black, strongly shining; elytra and legs piceous-black; antennae, beak and tarsi reddish-brown. Cheeks impunctate, each with several oblique wrinkles and 4—6 erect bristles; tylus with a few transverse impressions. Pronotum with a vague, feebly impressed, transverse post-median groove, this limited before and behind by an irregular row of rather coarse, sparsely placed shallow punctures; disk otherwise smooth or nearly so, the side margins each with 8—10 erect bristles. Scutellum almost an equilateral triangle, rather finely and very sparsely punctate. Elytra with two rows of vague shallow punctures near the inner edge of corium, otherwise nearly smooth, the basal half of costal border with three or four large punctures, each with a fine inclined bristly hair; membrane short, brownish-hyaline, but little surpassing the abdomen. Under surface smooth. Other structural characters as under generic heading. Length, 6.5—8 mm.; width, 3.5—4 mm.

Frequent in southern Indiana, April 17—Oct. 11; not taken north of Marion County. Occurs singly or in pairs beneath logs, stones and other cover, usually close to water, but sometimes on the slopes of high hills. One was beaten from oak foliage. Probably hibernates as imago. Raleigh and Sunburst, N. Car., April 12—May (*Brimley*). Sanford, Dunedin, Istokpoga, Moore Haven, Canal Point, Chokoloskee and Everglade, Fla., Jan. 12—Sept. 1 (*W. S. B.*). Listed from numerous other points in Florida and probably occurs throughout that state. The single specimen from Dunedin was taken from a rotten grape-fruit.

This, one of the largest and best known of our Cydnids, ranges from Quebec and New England west to Iowa and Nebraska and south and southwest to Florida, Oklahoma, Texas and Mexico, but is nowhere found in numbers and usually only beneath cover. Parshley has not taken it in New England, and includes it in his list only from the records of Uhler (1877, 384). Hart (1919, 204) mentions it as found in numerous localities in Central and Southern Illinois, but notes only one specimen from the northern part of the state. Stoner reports but a single specimen from each of two stations in Iowa. It is therefore probably very scarce north of latitude 41 degrees. Say (I, 323) mentions a variety *picca* from Indiana as being "entirely light piceous" in hue. All the Florida specimens average smaller than those from the north, and have the punctures of transverse impression of pronotum fewer and more irregularly placed.

36 (56). *PANGÆUS DISCREPANS* Uhler, 1877, 386.

Differs from *bilineatus* in its more bristly head and relatively longer and more slender second antennal. Pronotum with sides of apical half more rounded, the curve beginning at middle, not at apical third as in *bilineatus*, disk with transverse impression vague or wanting, but with numerous punctures across the basal third. Scutellum with more numerous and finer punctures, its tip more narrowly rounded, the transverse line at base deeper and with coarser punctures. Corium relatively longer and more narrow, its hind margin truncate and apical angle not prolonged; membrane shorter and broader than in either of our other species. Length, 6.5—8 mm.

Brownsville, Tex. (*U. S. Nat. Mus.*). The recorded range extends from Indiana and Tennessee, west and south to California and Texas.

37 (57). PANGÆUS UHLERI Signoret, 1882, 253.

Broadly oval, subdepressed. Dark reddish-brown to piceous, shining; antennae and legs paler. Head wider across the eyes than long, its apex very broadly rounded; cheeks obliquely rugose and bearing a few erect bristles, their margins rather broadly reflexed; second joint of antennae slender, slightly shorter than third, fourth and fifth a little longer, subequal. Pronotum about one-third wider than long, its front margin less deeply concave than in *biineatus*, the antemarginal impressed line very fine; disk with transverse impression more shallow, its punctures very irregular, a small deep round pit near each end of the front row; side margins narrowly inflexed, armed with eight or ten short erect bristles. Scutellum finely, sparsely, irregularly punctate, the narrow transverse impressed basal line finely punctate. Elytra with corium minutely alutaceous, its basal portion and costal nervure finely and sparsely punctate; embolium with more numerous fine shallow punctures; costal edge with three or four setae-bearing ones. Under surface smooth, polished. Front tibiae fossorial, gradually widened from base to apex and bearing numerous coarse bristle-like spines. Length, 5.5—6 mm.; width, 3—3.5 mm.

Sarasota, Fla., March 4 (*W. S. B.*). Raleigh and Beaufort, N. Car., July 18—Aug. 20 (*Brimley*). Very close to *bilineatus*, differing mainly in the smaller size, paler color, more evidently punctate elytra and more expanded apical half of front tibiae. Known only from North and South Carolina, Georgia, Florida and Texas. The only previous Florida record is that of Barber of a specimen taken by Engelhardt at Key West in November. First described by H.-Schaeffer as *Cydnus rugifrons*, then by Uhler (1877, 384) as *Pangæus rugifrons*. That specific name being preoccupied it was changed to *uhleri* by Signoret.

III. GEOTOMUS Mulsant & Rey, 1866, 34.

Small oblong-oval or elliptical subdepressed species having the head broad, subdeclivent, its apex broadly rounded; cheeks as long as tylus, their margins very narrowly reflexed and bearing a few remote bristles; antennae reaching base of pronotum, the joints subequal or gradually increasing slightly in length, third subclavate, fourth and fifth subfusiform; beak reaching middle coxae, its joints gradually decreasing in length; pronotum subquadrate, wider than long, front margin deeply concave, without impressed anteapical line, side margins nearly straight, narrowly recurved, hind one truncate; scutellum elongate-triangular, strongly narrowing towards apex, tip acutely rounded, overlapping the inner angle of corium; costal

border of elytra curved slightly inward near its apex, thus exposing very narrowly the hind portion of connexivum; membrane not surpassing the abdomen, its veins scarcely evident; osteolar tube slender, two-thirds the length of metasternal plate, prolonged beyond the opening as a curved flattened semi-circular lobe; front tibiae but slightly expanded.

Six species are known from North America, four occurring in the eastern states.²³ They are very similar in aspect, and, as the marginal bristles of head, pronotum and abdomen are usually eroded, they present a difficult group for classification.

KEY TO EASTERN SPECIES OF GEOTOMUS.

- a. Head distinctly and closely punctate; cheeks flat.
 - b. Larger, length 3.8 or more mm.
 - c. Disk of pronotum with a faint but very evident postmedian transverse impression, rather coarsely and closely punctate throughout except on a small median area; corium black; scutellum distinctly punctate. 38. ROBUSTUS.
 - cc. Disk of pronotum without transverse impression, punctate only on sides; corium piceous-brown; scutellum smooth or nearly so. 39. SUBPUNCTATUS.
 - bb. Smaller, length not over 3.2 mm.; form elongate-oval. 40. UHLERI.
 - aa. Head minutely or obsoletely punctate; cheeks subconvex; corium piceous-brown. 41. PENNSYLVANICUS.
- 38 (61). *GEOTOMUS ROBUSTUS* (Uhler), 1877, 390.

Oblong-oval, subdepressed. Black, shining; antennae dark reddish-brown, incisures paler; legs piceous; beak and tarsi reddish-brown. Head as broad across the eyes as long, its apex bluntly rounded; cheeks densely, coarsely, confluent punctate, their margins narrowly recurved; tylus transversely wrinkled. Antennae relatively stout, third joint one-fourth longer than second, slightly shorter than fourth, fifth longest. Pronotum subquadrate, convex, about one-fourth wider than long, sides straight on basal half, curving in front of middle around the obtuse front angles, their margins very narrowly reflexed, not concave or subexplicate within; disk with a vague but very obvious broad transverse groove behind the middle, the median area in front of this almost smooth, elsewhere densely punctured, more coarsely so on sides. Scutellum elongate-triangular, its apex very narrowly rounded; disk coarsely, shallowly and sparsely punctate, the apical third more finely so. Elytra nearly throughout distinctly, rather finely and closely punctate, the apical half of corium more sparsely so. Propleura coarsely rugosely punctate; abdomen with sides finely striate, minutely punctate. Length, 3.8—4.2 mm.; width, 2—2.2 mm.

²³The *Geotomus subglaber* (Walker, 1867, 150), is known only by the single type specimen in the British Museum labelled "North America." The description is not sufficiently distinctive for its proper placement, and the locality uncertain. It is therefore not considered in this work.

Marion and Perry counties, Ind., scarce, May 21—Oct. 1. Specimens taken in May and June were swept from herbage in dense moist woodlands; in October by sifting debris from about the base of a beech tree. Ranges from Massachusetts west to Nebraska and south to Florida. I have not taken it in Florida but it is recorded from Tampa, Lakeland and Jacksonville, May-November, by Barber. Nothing definite as to its habits has been published and it appears to be scarce at all recorded localities.

39 (—). *GEOTOMUS SUBPUNCTATUS* sp. nov.

Broadly oval, subdepressed. Black, shining; elytra and tibiae piceous; antennae and tarsi reddish-brown. Head broader across the eyes than long, its apex evenly semicircular; cheeks densely but more finely and not confluent punctate as in *robustus*, their margins more broadly reflected. Antennae shorter and more slender than in *robustus*; joints 2—5 subequal in length, 2 cylindrical, 3 and 4 subclavate; 5 fusiform, distinctly smaller and less pubescent than in *robustus*. Pronotum about one-half wider at base than long at middle, sides slightly curved from middle to the obtuse front angles, disk with sides rather broadly flattened and with a wide shallow longitudinal concavity within and along nearly their full length; surface smooth or minutely very sparsely punctate over the entire median area, the sides densely and finely punctate. Scutellum relatively shorter and broader than in *robustus*, minutely, sparsely and almost invisibly punctate throughout, except along the submarginal lateral lines. Elytra distinctly punctate only on narrow basal third of corium, elsewhere very minutely and sparsely so. Propleura finely strigosely punctate; abdomen minutely and very sparsely punctate. Genital plate in both sexes distinctly not closely punctate. Length, 4—4.2 mm.; width, 2.1—2.3 mm.

Dunedin, Fla., Feb. 6; two sifted from vegetable debris along the bay front (H. S. B.). Wilmington, N. Car., April 17; Plum Point, Md., Aug. 9 (Barber). The Barber specimens were labelled "*G. robustus* Uhler," but they are very different from that species, as described above and by Uhler, in the characters given in key, and especially in the form of thorax, the margins of which are not rounded in front of middle, but only very slightly curved and sides of disk distinctly more flattened. The punctuation above is everywhere more sparse and the form more broadly oval.

40 (64). *GEOTOMUS UHLERI* Signoret, 1883, 211.

Elongate-oval, subdepressed. Black, strongly shining; antennae reddish-brown, the incisures paler; tibiae piceous; beak and tarsi red-

dish-brown. Head a little wider across the eyes than long, its apex evenly broadly rounded; cheeks finely and closely punctate with minute oblique wrinkles between the punctures, their margins scarcely at all reflexed; antennae relatively short and stout, joints 2—4 subequal, 5 a little longer. Pronotum slightly wider than long, sides straight from base to apical third, then broadly curved, their margins very narrowly reflexed, front angles obtusely rounded; disk with an evident but shallow transverse groove behind the middle, the median area in front of this minutely and sparsely punctate, the sides finely and very closely so. Scutellum finely, shallowly, unevenly and very sparsely punctate. Elytra distinctly and rather closely punctate, the apical half of corium more sparsely so. Sides of abdomen finely densely strigose, under surface elsewhere, smooth or nearly so. Length, 3.2 mm.; width, 1.7 mm.

Dunedin, Fla., April 22; one specimen swept from herbage in low moist ground. Described by Signoret from "North America," without definite locality. Except in size it is almost a replica of *robustus*. The head is less densely punctate, the pronotum with sides of front half less rounded, the disk more sparsely punctate behind the transverse groove, the latter relatively deeper on sides.

41 (62). *GEOTOMUS PENNSYLVANICUS* Signoret, 1883, 207.

Oblong-oval, subconvex. Black or piceous-black, shining; apical half of corium and legs piceous; antennae and legs reddish-brown. Head shorter and more declivent than in preceding species, its apex bluntly rounded; cheeks subconvex, impunctate or nearly so, each with a few fine wrinkles, the margins very narrowly recurved; antennae with joints 2—4 subequal, fifth longest, fusiform, acutely pointed. Pronotum subconvex, but slightly broader than long; sides feebly curved in front of middle, their margin very narrowly recurved; disk without transverse impression but with a vague shallow longitudinal one each side, closely and finely punctate on sides and behind, almost smooth in front of middle. Scutellum strongly tapering to the narrowly rounded apex, its disk faintly transversely rugose, rather coarsely and very sparsely punctate, more finely so on apical third. Elytra finely sparsely and distinctly punctate on basal half, obsoletely so on apical half of corium. Under surface almost smooth; sides of abdomen minutely strigose. Genital segment finely and closely punctate. Length, 3.2—3.7 mm.; width, 1.8—2 mm.

Blantyre, N. Car., May (*Brimley*). Mobile, Ala., April 20 (*Gerhard*). This is the *Melanathus picinus* of Uhler (1877, 391), his specific name being preoccupied. His types were from York Co., Pennsylvania, and it has been heretofore recorded only from that State, Georgia and Illinois; Hart (1919, 204) listing "one specimen from Urbana, Ill., Oct. 21." From

our other species it is readily separated by the smooth, subconvex, shining cheeks, and from all but *subpunctatus* by the lack of transverse impression on pronotum.

IV. GEOCNETHUS Horvath, 1919, 245.

Differs from *Geotomus* mainly by the characters mentioned in key and by having joint 4 of antennæ distinctly longer than either 2 or 3, which are subequal in length. The genus is represented by a number of species in South America but only one is so far known from this country.

42 (—). GEOCNETHUS CAVICOLLIS (Blatchley), 1924, 85.

Broadly oval, subdepressed. Head, pronotum, scutellum and under surface black, shining; hind margin of pronotum and corium piceous; membrane dull whitish- to fuscous-hyaline; antennæ, beak, tibiæ and tarsi reddish-brown; femora piceous. Head slightly wider across the eyes than long, its front margin broadly rounded, thickened and reflexed, but without bristles or teeth within the margin; cheeks vaguely, transversely rugose, sparsely, irregularly, rather finely punctate, each with three erect discal setæ. Antennæ with joint 2 more slender than 3 and almost nude, 3—5 thickly pilose with stiff suberect hairs, 5 slightly longer than 4. Beak reaching middle coxæ.

Pronotum about twice as wide as its median length, the front margin broadly concave, bordered within by a regular row of rather coarse punctures, the lobes separated only by an incomplete transverse row of coarse punctures; side margins feebly sinuate; disk of male with a large, broad, rather deep impunctate concavity on middle of apical half, on each side of this sparsely and coarsely punctate, the punctures extending along the sides behind the concavity to basal third; disk of female with a vague wide transverse impression. Submargins of head and pronotum with a few scattered erect bristly hairs. Scutellum with a submarginal row of fine punctures and a few coarser scattered ones on apical half.

Corium with four irregular rows of punctures, the inner row nearly entire, the others abbreviated; clavus with a single row of punctures; membrane not reaching apex of abdomen in either sex. Genital plate of male deeply concave above, its apex broadly rounded. Length, 5—6 mm. (Fig. 14).

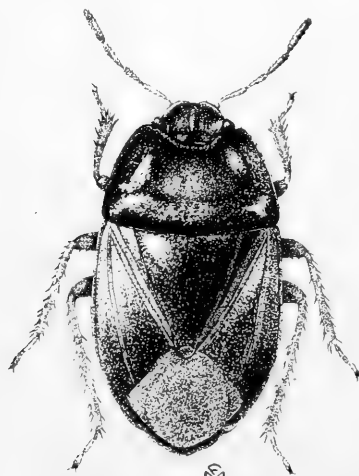


Fig. 14. X 8. (Original).

Dunedin, Miaka, Arch Creek and R. P. Park, Fla., Feb. 3—April 10. Taken by sifting dead leaves and beneath cover along the margins of hammocks. Known also from Gainesville, Fla., Alabama and North Carolina. This species forms a sort of connecting link between the genera *Pangaeus* and *Geotomus*. In size and general facies it more closely resembles the former, but the preapical impressed line of pronotum, which is the primary distinguishing character of *Pangaeus*, is represented only by a row of coarse punctures.

V. MACROPORUS Uhler, 1876, 278.

Broadly oval, sub-convex species, having the margins of head and pronotum sparsely ciliate; head broad, its apex bluntly rounded; cheeks with margins broadly reflexed and with a distinct submarginal groove beset with short erect spines; antennae with second joint half as long as third, 3—5 subequal, stouter, submoniliform; beak reaching middle coxae, joint two shorter than three and four united, these subequal; pronotum subquadrate, front angles rounded, prolonged to beyond middle of eyes, side margins oblique, feebly curved near apex, disk narrowed in front and with a vague impressed line behind the front margin; corium broad, its hind margin feebly sinuate. One species is known.

43 (45). MACROPORUS REPETITUS Uhler, 1876, 279.

Broadly oval, slightly wider behind the middle. Above dark reddish-brown; membrane pale translucent; under surface dark chestnut-brown, legs, antennae and prosternum paler. Submarginal groove of head with several long hairs in addition to the numerous short spines. Pronotum with a vague transverse postmedian impression, this and side margins of apical half thickly punctate, middle of apical half almost smooth. Scutellum finely sparsely punctate and with a vague median carina. Corium short, much broadened behind, evenly, rather coarsely and sparsely punctate. Other characters as in key and under generic heading. Length, 3.5—4 mm.

San Gabriel, Cal., June (*U. S. Nat. Mus.*). Described from California. Uhler, (loc. cit.), mentions the finding of a single specimen beneath a stone on the side of a hill near Baltimore, Md. Not elsewhere recorded from the East.

VI. CYDNUS Fabricius, 1803, 184.

Small or medium sized, broadly oval subconvex species having the body thickly fringed with long hairs; head declivent,

its apex broadly rounded; cheeks slightly longer than tylus, their margins broadly recurved, and beset within with very numerous erect bristles and short spines; antennae short, stout, not reaching base of pronotum, second joint much shorter than third, 3—5 subequal; beak reaching middle coxae, second joint shorter than third and fourth united; pronotum subquadrate, wider than long, its sides feebly curved in front of middle, front margin deeply concave without impressed line behind it, front angles obtusely rounded, disk with a vague transverse impression at basal third; scutellum short, broad, triangular, its tip broadly rounded; corium short, wide, its apex truncate; membrane not surpassing abdomen, without veins; osteole short, lying very near and parallel to front margin of metasternal plate, its opening ending in a rounded concavity; front tibiae fossorial, gradually widened toward apex, beset with numerous acute spines.

Van Duzee has merged this genus with *Acthus* Dall, but the broadly rounded apex of scutellum, much shorter second antennal joint, fringe of long hairs around the entire body, short veinless membrane, and different form of osteole are sufficient to justify its retention. Two species are known, one of which occurs frequently in the eastern states. The other, *C. testudinatus* (Uhler) (1876, 276), was described from California, is known from Colorado and New Mexico, and is accredited to "Indiana" by Van Duzee (1917, 20), but no other record of its occurrence east of the Mississippi can be found, hence it is not included. There is very little in the original description to distinguish it from *obliquus*.

44 (53). CYDNUS OBLIQUUS (Uhler), 1872, 394.

Broadly oval, subconvex, obtuse behind, thickly fringed on all margins with long hairs. Chestnut brown, shining; antennae and legs reddish-brown, the tarsi paler. Head declivent, as broad across the eyes as long; cheeks slightly convex, finely obliquely wrinkled, with a few fine punctures and a distinct fovea near eyes, each with about ten short submarginal teeth and six or seven longer bristles; tylus with two teeth; occiput more strongly convex, impunctate. Pronotum about one-third wider than long, subconvex; disk with a curved row of punctures near front margin behind which is a large curved transverse smooth area; elsewhere coarsely and closely punctate, more sparsely so near base. Scutellum with convex area near base almost smooth, behind this finely and rather closely punctate. Elytra finely and sparsely punctate; costal edge with eight or ten setae-bearing punctures. Abdomen smooth at

middle, minutely striate on sides. Length, 4—4.5 mm.; width, 2.5—2.8 mm.

Miller, Lake Co., Ind., July 4 (*Gerhard*). Oregon, Ill., June 21 (*Hart*). Amedee, Cal., July 21 (*Gerhard*).²⁴ Ranges from New York and New Jersey west to Oregon and California and southwest to Texas and Arizona. Not recorded in the east south of New Jersey. It appears to occur only in sandy areas. Hart (1919, 205) records the taking of eight, June 21, under a board in a sand "blowout" at Oregon, Ill. Stoner (1920, 34) has given an interesting account of its occurrence in Iowa from which I quote as follows:

"The first specimens were found on May 22, 1915, about the roots of rush grass, *Sporobolus cryptandrus* (Torr.), growing in a sandy area two miles north of Iowa City. This uncultivated area of perhaps two acres extent is near the banks of the Iowa River and supports a typically arid vegetation. In the numerous visits to this place careful search about the roots of the rush grass revealed many specimens. Sometimes as many as four adults, but oftener only one or two would be found among the roots of a single plant. At no time were the insects observed walking about on the sand. Several times specimens were found with a small seed of some kind held close to the thorax by the middle pair of legs. When the insect was freed from the sand and allowed to walk freely it still clung to the seed, progressing by means of the front and hind legs only.

"In the summer of 1916 this Cydnid was found in considerable numbers on the sandy beach at Gull Point on West Okoboji Lake. On July 4 the nymphs were found to be more abundant than the adults. In all 63 specimens were taken; 57 of these were nymphs, some still in the first instar, others apparently ready to molt for the last time. A number of dead adults and a single live one were also taken. The specimens were collected from among the roots of the following plants, all of which grew in considerable abundance on this sandy peninsula: beard tongue, *Pentstemon grandiflorus* Nutt.; sedge, *Cyperus schweinitzii* Torr.; wormwood, *Artemisia caudata* Michx., and rush grass, *Sporobolus cryptandrus* (Torr.). Usually not more than three or four nymphs were found in a single plant; however in one instance 27 nymphs of different sizes were found in the sand among the roots of one small bunch of the rush grass."

VII. *ÆTHUS* Dallas, 1851, 110.

Oval or subelliptical subdepressed species having all the margins ciliate; head subdeclivent, wider across the eyes than long,

²⁴These California specimens were taken by Wickham at an elevation of 4,200 feet and determined by Van Duzee. They are 5 mm. in length and may represent *C. testudinatus* Uhler.

its apex very broadly rounded; cheeks flat, equalling tylus, their margins broadly reflexed, the submargins with numerous erect teeth and longer bristles; antennae with second joint slender, 3—5 stouter, subequal; beak reaching or slightly surpassing middle coxae, its basal joint as long as or slightly longer than bucculae, second and third joints subequal, fourth shorter; pronotum subquadrate, but little wider than long, its sides feebly curved in front of middle, front margin deeply concave, without an antimarginal impressed line; subbasal transverse impression very faint, with a single very irregular row of punctures; scutellum triangular, strongly tapering, longer than wide, slightly contracted opposite apex of clavus, the tip narrowly rounded; corium with hind margin truncate, the outer apical angle slightly prolonged; membrane feebly surpassing abdomen, its veins distinct, simple; osteole reaching middle of metasternal plate, its opening minute, extended as a flattened oblique plate; front tibiae fossorial, armed with numerous stout spines.

Besides the species separated above under *Cydnus*, five others are recognized by Van Duzee from North America, two of which occur in the eastern states.

KEY TO EASTERN SPECIES OF *ÆTHUS*.

- a.* Second joint of antennae more slender and nearly one-half longer than third, fourth and fifth joints subequal; beak slightly surpassing middle coxae. 45. *COMMUNIS*.
 - aa.* Second joint of antennae shorter than third, fifth joint longer than fourth; beak just reaching middle coxae. 46. *INDENTATUS*.
- 45 (50). *ÆTHUS COMMUNIS* Uhler, 1877, 379.

Elongate-oval, subdepressed, all the margins ciliate. Piceous-black, shining, tibiae dark reddish-brown, antennae and tarsi paler. Head wider across the eyes than long, its apex very broadly rounded; cheeks slightly convex, smooth or nearly so, each with a bristle-bearing fovea near eye and another near apical fourth of tylus, the submargin of each also with 10—12 short erect acute bristle-like teeth and four or five much longer bristles. Pronotum about one-fourth wider than long, its sides curving from apical third to the obtusely rounded front angles; disk smooth except for a few rather coarse punctures along the front edge and behind the front angles, the vague transverse subbasal impression with a very irregular row of similar punctures. Scutellum very sparsely and coarsely punctate, the convex basal portion and flattened tip almost smooth. Elytra rather coarsely and evenly, not closely punctate, the apical third of corium much more sparsely so; costal border with six to eight coarse setae-

bearing punctures. Under surface smooth, the margins of abdomen with a few minute bristle-bearing punctures. Genital plate of male broadly scoop-shaped, minutely punctate. Length, 6—7.5 mm.; width, 3.5—4 mm.

Putnam Co., Ind., Aug. 26; two specimens from beneath stones in woodland pastures. Ormond, Dunedin, Chokoloskee and Long Key, Fla., Nov. 16—June 1 (*W. S. B.*). Recorded also by Uhler from St. John's River and Orange Springs, Fla., and probably occurs along or near the coasts of the entire state. One of my Dunedin specimens was taken from the axils of the leaves of a thistle on Hog Island, the others from beneath the debris of weeds on the bay beach or crawling along the concrete gutters or in excrement. Described from Cuba and known heretofore in this country only from Florida and Texas.

46 (51). *ÆTHUS INDENTATUS* (Uhler), 1877, 380.

"Oval. Pale rufo-castaneous; antennae pale ocherous or ferruginous; legs ocherous or pale rufo-flavous, tarsi paler yellow. First joint of antennae stout, reaching a little beyond margin of head; second slender, shorter, a little shorter than third; the third increasing toward the tip, subequal to fourth; fourth and fifth fusiform, the latter longest. Rostrum extending to the intermediate coxae. Pronotum highly polished, subquadrate; anterior lobe a little convex, impunctate, excepting on sides, the transverse line feeble, placed far behind the middle, set with a few fine remote punctures and with a few fine punctures behind it. Corium with fine scattered punctures around the sides and ends; costal margins with one setigerous pit near the base. Length, 5.5—6.5 mm.; width of base of pronotum, 2—2.5 mm." (*Uhler*).

The above comprises the more important parts of the original description. The species was described under the name *Rhytidophorus indentatus* from Cuba and southern Florida. Barber (1914, 525) recorded specimens as in the Davis collection taken at Lakeland and Key West, Fla., but an examination of these shows them to be *A. communis* (Uhl.). McAtee (Ms.) states that there is no specimen bearing Uhler's name in the National Museum collection.

VIII. *AMNESTUS* Dallas, 1851, 126.

Very small, oblong or elongate-oval subdepressed species having the head declivent, longer than wide; tylus slightly longer than cheeks, its front margin recurved and bearing four short blunt, comb-like teeth, cheeks each with four or five similar teeth; antennae slender, the second joint less than one-third

the length of third; beak reaching or surpassing middle coxæ, joints 2 and 3 usually subequal, 4 shorter; pronotum subquadrate, wider than long, front angles rounded, disk with front portion convex, elevated and separated from the shorter hind one by a more or less evident transverse groove; scutellum triangular, broader at base than long, its tip very acute, the coria meeting behind it; elytra with corium much widened behind, its apex distinctly sinuate; membrane whitish-hyaline, much surpassing the abdomen, its veins evident but very fine; osteolar canal long, slender, attenuated, feebly curved, distinctly grooved, almost reaching outer edge of metasternal plate; metasternum extended backward in the form of a thin plate which is widened towards the sides to cover the first and second ventrals; front tibiae fossorial, gradually widened toward apex; front femora of female usually with a bifid tooth.

Eight species are known, mostly from tropical or subtropical America, five of which occur in the eastern states.

KEY TO EASTERN SPECIES OF AMNESTUS.

- a.* Larger, length 3.2 or more mm.; color a uniform dark chestnut-brown. 47. SPINIFRONS.
 - aa.* Smaller, not over 2.7 mm.; color in part or wholly pale yellowish- or reddish-brown.
 - b.* Elevated front portion of pronotum rather evenly and coarsely punctate; cheeks each with four submarginal teeth.
 - c.* Length 2.2—2.5 mm.; form elongate-oval. 48. PUSILLUS.
 - cc.* Length less than 2 mm.; form elongate-quadrangular. 49. PUSIO.
 - bb.* Elevated front portion of pronotum sparsely, finely and unevenly punctate.
 - d.* Color a nearly uniform pale yellowish-brown; cheeks each with five submarginal teeth. 50. PALLIDUS.
 - dd.* Head, pronotum and scutellum dark reddish- to chestnut-brown; elytra brownish-yellow; cheeks each with four irregular submarginal teeth. 51. SUBFERRUGINEUS.
- 47 (67). AMNESTUS SPINIFRONS (Say), 1825, 316; II, 242.

Elongate-oval, subconvex above, more convex beneath. Above chestnut-brown, the elytra somewhat paler; antennae and under surface reddish-brown; legs dull yellow. Head narrowly oval, longer than wide; cheeks rugose, coarsely unevenly punctate, each with five, rarely six, erect, blunt submarginal teeth, and a few very fine bristles; tylus with four similar teeth; antennae with joint 3 longest, subclavate, 4—5 subequal, all thickly pubescent; beak reaching hind coxæ, its third joint longer than second. Pronotum convex, but slightly wider than long,

sides straight from base to middle, thence broadly rounded to apex, their margins very narrowly reflexed, remotely ciliate; disk in great part rather coarsely and closely punctate, the anterior elevated portion and extreme base finely and sparsely so, the transverse groove shallow and ill defined. Scutellum short, convex, triangular, rather coarsely and remotely punctate, its submarginal impressed lines finely and closely punctate. Elytra rather finely, evenly and closely punctate, the middle of apical half of corium more finely and sparsely so; outer apical angles of corium surpassing the abdomen, inner ones meeting behind the acute apex of scutellum. Abdomen minutely and sparsely punctate, each puncture bearing a very fine prostrate yellowish hair. Front femora of female with an oblique bifid tooth. Length, 3.2—4.2 mm.; width, 2 mm.

Lake, Steuben, Kosciusko, Marion, Putnam and Vigo counties, Ind., May 1—Oct. 21. Not taken in the southern counties and scarce wherever found. Taken by sweeping herbage or sifting debris in low moist grounds. Dunedin, Fla., Jan. 27—March 23; the first record for that State. Say's types were from Missouri and its known range extends from New England to Nebraska, and south to Florida and Texas. Uhler (1877, 371) records one as taken near Baltimore March 18, beneath decaying wood in a loamy valley, and another March 28 from Massachusetts, so that it probably hibernates as imago. Hart records it only from central and northern Illinois, March to November; Stoner and Zimmer as very rare in Iowa and Nebraska, the former sweeping it from blue-grass on sandy knolls.

48 (68). AMNESTUS PUSILLUS Uhler, 1876, 278.

Elongate-oval, subconvex. Pale brownish-yellow, antennæ, legs and beak dull yellow. Head sculptured as in *spinifrons*; cheeks each with four long teeth. Pronotum subquadrate, one-third broader than long, the transverse groove narrow, deep, not reaching the margins; sides of apical half distinctly rounded, with margins subexplanate; disk coarsely and evenly, not closely punctate, more finely so near base; humeri prominent, smooth. Scutellum coarsely and sparsely punctate. Elytra very evenly, coarsely and closely punctate, the middle of corium more sparsely so, its outer apical angle not passing the abdomen. Abdomen smooth, finely pubescent; hind femora of female with a long slender spine. Length, 2—2.5 mm.; width, 1.3—1.5 mm.

Lake, Tippecanoe, Vigo and Orange counties, Ind., May 25—Dec. 23; a single specimen on the latter date hibernating beneath a chunk on a wooded sandy hillside. Raleigh, N. Car., June 28 (*Brimley*). Agricultural College, Miss. (*Wced*). This species is less common in Indiana than *A. pallidus* and occurs in summer on low vegetation along streams, borders of cultivated fields and roadsides, also at electric light. Ranges from New

England to Colorado, south to Florida and Texas. I have not taken it in Florida, but it has been recorded from Crescent City, Biscayne Bay, LaBelle and Everglade, and probably occurs sparingly throughout the State. Uhler (loc. cit.) records it from Cuba, but perhaps confused it with *pusio* Stal. He states (1877, 371) that "in the Black Mountain range of North Carolina and Tennessee it has been met with in large numbers." Hart records it from central and southern Illinois, but not from the northern part of that State, and it occurs very rarely in both Iowa and Nebraska. The submarginal teeth of cheeks are distinctly longer, the transverse groove of pronotum deeper and more sharply limited, and the area in front of it more distinctly punctate in this species than in *A. pallidus* Zimm.

49 (—). *AMNESTUS PUSIO* (Stal), 1860, 14.

I refer to this species a number of minute specimens taken in Florida. They are more narrowly elongate than in *pusillus*, and have the front portion of pronotum shorter, with side margins less flattened. Length, 1.8 mm.; width, 1 mm.

Dunedin, Royal Palm Park and Ft. Myers, Fla., Dec. 10—March 28; taken from the mucky margins of ponds beneath decaying remains of pickerel weed; also at electric light. Described from Rio Janeiro, Brazil, and recorded from the West Indies, but not before taken in this country.

50 (69). *AMNESTUS PALLIDUS* Zimmer, 1910, 166.

Form and size of *pusillus*. Pale chestnut-or reddish-brown. Head as in *pusillus*, each cheek with five shorter, comb-like teeth. Pronotum with front portion a little longer, more convex, a transverse row of punctures near its front margin and a few on sides, elsewhere very sparsely and finely punctate; transverse groove wider, more shallow, less well defined, coarsely punctate, the basal area behind it with punctures less coarse and more sparse. Scutellum and elytra more finely and sparsely punctate than in *pusillus*; corium with apex trisinate, its outer apical angle subacute, surpassing the abdomen. Abdomen finely pubescent. Front femora of female with a large bifid tooth at basal third of lower surface; tibiae more pubescent than in *pusillus*. Length, 2.2—



Fig. 15, X 13. (Original). 2.7 mm.; width, 1.1—1.3 mm. (Fig. 15).

Widely distributed but nowhere common in southern Indiana; Starke County only in the north, April 17—Aug. 9.

Taken by sweeping low herbage along roadsides and in waste places. Ranges from Massachusetts west to Nebraska. Probably confused in many collections with *pusillus* which superficially it closely resembles. Hart records it from several stations in different parts of Illinois, April 18—Dec. 4. Stoner swept it in June from plantain-leaved everlasting, *Antennaria plantaginifolia* (L.), near Iowa City, Ia.

51 (—). *AMNESTUS SUBFERRUGINEUS* (Hope), 1837, 19.

Ob'long, subconvex. Head and scutellum dark reddish-brown, pronotum chestnut-brown, its margins paler; elytra, legs and beak brownish-yellow; under surface chestnut-brown, the sterna and ventrals 4—6 paler. Antennæ piceous-black with yellowish hairs, joint 2 very small, only about one-sixth as long as 3, the latter one-half longer than 4, 5 fusiform, more slender than either 3 or 4. Pronotum with sides straight from base to middle, thence broadly curved to apex; disk with two transverse subapical rows of coarse punctures, the elevated area behind them finely and sparsely punctate; basal third coarsely and thickly so. Corium sparsely and coarsely punctate, its outer apical angle not reaching tip of abdomen. Ventrals minutely punctate, rather thickly and finely pubescent. Length, 2.5—2.7 mm.

Royal Palm Park, Fla., Dec. 9; two specimens sifted from vegetable debris by the side of picnic table. A neotropical species described from St. Vincent's Island and not before recorded from this country. Prof. H. G. Barber, who identified them for me, states (Ms.) that he has seen a number from Porto Rico.

IX. *SEHIRUS* Amyot & Serville, 1843, 96.

Small broadly oval, subdepressed species without marginal ciliæ, having the head declivent, longer than wide, its apex rounded; cheeks equalling or slightly longer than tylus, their margins narrowly reflexed, not ciliate or toothed; antennae slender, surpassing base of pronotum, their joints gradually slightly increasing in length; beak reaching middle coxae, joints 2 and 3 subequal, 4 shorter; pronotum one-half wider than long, sides feebly curved and converging from base to apex, front angles obtuse; scutellum equilaterally triangular, its tip depressed, bluntly rounded; elytra broad, the apex of corium subtruncate; membrane reaching tip of abdomen, its veins few and very fine; osteolar opening continued as a long shallow curved canal, reaching nearly to outer end of meta-

sternal plate; front tibiae enlarged beyond the middle but not flattened, middle and hind ones terete, slender, all armed with a few short spines. Genital plate of male broadly scoop-shaped, its hind margin narrowly reflexed.

One species occurs in North America.

52 (71). *SEHIRUS CINCTUS* (Palisot de Beauvois), 1805, 114.

Broadly oval, subdepressed, bluntly rounded behind. Piceous-black or blue-black, shining; side margins of pronotum and elytra narrowly edged with ivory-white; corium often with a small white spot near outer posterior angle; membrane piceous-brown; antennae piceous, the second joint and incisures paler; beak, tibiae and tarsi piceous or reddish-brown, the tibiae with a smooth white line on outer side. Cheeks not meeting in front of tylus, finely, closely confluent punctate. Pronotum distinctly narrowed from base to apex; disk with a broad, vague shallow transverse impression, in front of which is a curved smooth area, elsewhere coarsely, unevenly, confluent punctate. Scutellum obliquely transversely wrinkled, finely, sparsely, unevenly punctate. Elytra evenly, finely, not closely punctate. Under surface finely, and regularly punctate, the middle of abdomen almost smooth. Length 4—7 mm.; width, 2.5—3.5 mm. (Figs. 9, *a* and 16).

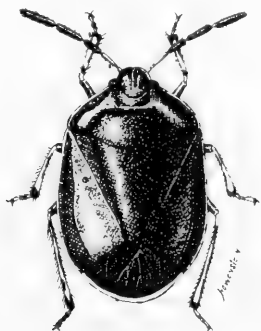


Fig. 16. X 10.
(After Lugger).

Found throughout Indiana but much more frequent in the central and southern portion, April 2—Sept. 18. Evidently hibernates as imago, as specimens have been found crawling along sandy pathways and beneath logs in early April. In summer it occurs on milkweed, flowers of wild plum and other foliage in sandy or alluvial soils, and along fence rows. Sanford and Dunedin, Fla., April (H. S. B.); taken by sweeping low vegetation near borders of ponds. These are the only definite stations for that State, though specimens labelled "Florida" are in the U. S. National Museum. This is one of our more common Cydnids, the thickened white edges of pronotum and elytra and the lack of marginal ciliae making it easily recognized. Its known range extends from Quebec and New England west to British Columbia and Nebraska and south to Florida, Mississippi, Texas and Mexico. Hart (1919, 203) records it as occurring in sandy regions in numbers on the stems of the pale horse-mint, *Monarda punctata* (L.); also on sweet clover and nettle. In Iowa Stoner has found the imagoes hiber-

nating beneath sticks and boards in a meadow and beneath leaves and grass in a sandy pasture near the Iowa River, and in summer has swept it from raspberry, wild cherry, blue-grass and timothy. The white spot often found on corium is absent in all but one of the Indiana and Florida specimens at hand. The *Cydnus ligatus* Say (I, 322) is a synonym.

Family V. PENTATOMIDÆ Leach, 1815, 121.

THE STINK-BUGS.

Heteroptera of medium or large size and oval subdepressed form, having the head usually porrect, triangular, much narrower than thorax; antennæ usually longer than head and pronotum, 5-jointed, the first joint thickened, the second slender; beak 4-jointed; ocelli present; pronotum subhexagonal, its front portion more or less declivent, lateral angles usually prominent, often spinose; scutellum of medium or large size, extending beyond middle of abdomen, usually flattened and narrowed behind to form a triangle, rarely (*Stirctus*) U-shaped and then longer and more convex, its lateral margins each furnished with a frenum reaching or surpassing its middle, on which, in repose, the inner edge of clavus is received; corium with opaque portion broad and subtriangular; membrane with numerous veins; tibiae not spinose; tarsi 2- or 3-jointed. The sexes are readily distinguished, the external genitalia of the males consisting of several curiously formed hooks covered wholly or in great part by a convex genital plate, while in the female there are several smaller plates fitted closely together.

This large family of Pentatomidae is cosmopolitan in distribution and is best represented in the tropical regions of both hemispheres. Its members are terrestrial and leaf-eating or predaceous in habit. But few of them are numerous enough at any one time and place to do much damage to vegetation, while some are very beneficial in destroying the young and adults of other injurious insects. When handled or disturbed all exude a liquid having a characteristic disagreeable odor and taste, whence the common family name.

In Europe the female of *Acanthosoma grisca* L., one of these Pentatomids, is known to protect both her eggs and the young. It inhabits the birch, and the 30 or more young, after hatching, are led about by the mother much as a hen conducts her

chickens. She never leaves them, and as soon as she begins to move all the little ones closely follow and whenever she stops assemble in a cluster around her. "When a branch is cut which is peopled by one of these families, the mother shows every symptom of excessive uneasiness. In other circumstances such an alarm would cause her immediate flight, but now she never stirs from her young, but beats her wings incessantly with a

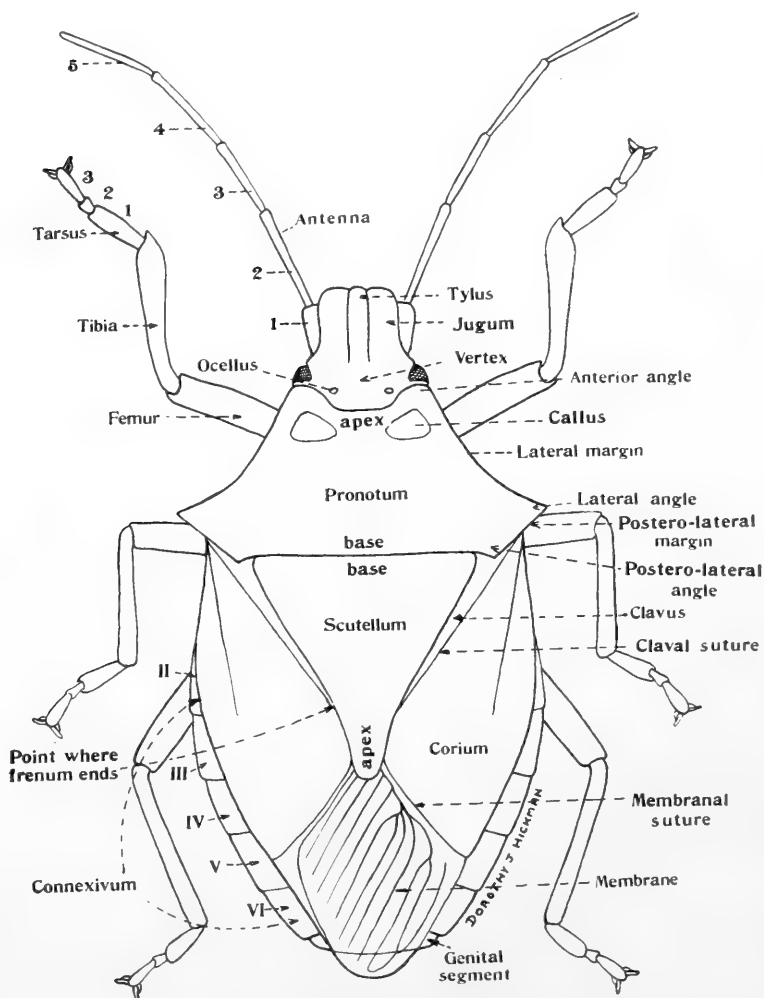


Fig. 17. *Apateticus cynicus* (Say). Dorsal view X 5. Illustrating parts used in description of a Pentatomid. (After Parshley in "Hemiptera of Connecticut").

very rapid motion, evidently for the purpose of protecting the young from the apprehended danger.”²⁵

Exclusive of the subfamily Graphosomatinae, Van Duzee in his Catalogue lists from America north of Mexico 159 species of Pentatomidæ, distributed among 50 genera. Of these 97 species, representing three subfamilies and 42 genera, are known to occur in the territory covered by this work. The principal literature treating of our North American species is as follows: Stal, 1867, 1870; Van Duzee, 1904, 1909; Schouteden, 1905, 1907; Bergroth, 1907, 1914a; Summers, 1898; Zimmer, 1911; Parshley, 1915; Hart, 1919; Stoner, 1920.

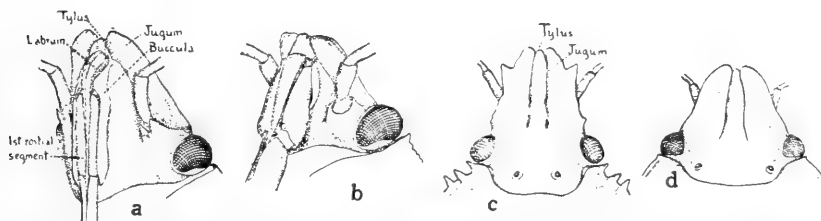


Fig. 18. Ventral and dorsal views of heads of Pentatomidæ. *a* and *d*, of *Rhytidolomia*; *b*, of *Apateticus*; *c*, of *Brochymena*. (After Parshley in Psyche).

KEY TO SUBFAMILIES OF PENTATOMIDÆ.

- a.* Tarsi 3-jointed; sternum of thorax (except in *Edessa* and *Arvelius*) without a central ridge or keel.
 - b.* First segment of beak slender, embedded between the bucculæ, which are wide and parallel (fig. 18, *a*); base of beak distinctly separated from end of tylus. Subfamily I. PENTATOMINÆ, p. 93.
 - bb.* First segment of beak short and thick, free, only its base being between the bucculæ, which converge and unite behind or beneath the beak (fig. 18, *b*); base of beak close to end of tylus.
 - Subfamily II. ASOPINÆ, p. 178.
- aa.* Tarsi 2-jointed; sternum of thorax with a lengthwise central ridge or keel; frena very long, almost reaching tip of scutellum.
 - Subfamily III. ACANTHOSOMINÆ, p. 204.

Subfamily I. PENTATOMINÆ Stal, 1864, 32, 76.

This subfamily contains the large majority of our stink-bugs. They vary much in size and appearance, but agree in having the body more or less oval and subdepressed; head porrect or nearly so; bucculæ parallel, not united behind, forming a groove for the reception of the basal joint of the beak which is normal

²⁵Kirby & Spence, Introduction to Entomology, 6th Ed., 1859, 203.

in size; pronotum with side margins either entire, or armed with numerous blunt teeth; scutellum subdepressed, usually subtriangular, narrowed behind, and shorter than the corium; tarsi 3-jointed.

Six tribes of the subfamily are recognized as being represented in North America. Of these members of four occur in the eastern states.

KEY TO EASTERN TRIBES OF PENTATOMINÆ.

- a.* Body regularly oval, very flat, broadest behind the middle, all the margins explanate (fig. 19); head about as wide as base of scutellum, flat above; scutellum broad, but slightly narrowed apically.
Tribe I. SCIOCORINI, p. 94.
- aa.* Body usually broadest at humeral angles of pronotum, its margins not uniformly flattened; head narrower than base of scutellum or, if nearly as wide, not flat above; scutellum narrowed behind.
- b.* Cheeks usually with a distinct tooth on sides near their tips (fig. 18, *c*); abdomen with a shallow lengthwise median groove; head very long, its sides not, or but slightly, sinuate in front of eyes; side margins of pronotum usually with numerous coarse teeth.
Tribe II. HALYINI, p. 95.
- bb.* Cheeks without a lateral tooth near their tips (fig. 18, *d*); abdomen usually without trace of median groove; head shorter, its sides more or less sinuate in front of eyes; side margins of pronotum usually unarmed.
- c.* Metasternum without a median smooth area as described in *cc*.
Tribe III. PENTATOMINI, p. 103.
- cc.* Metasternum with a broad median smooth area, its front end prolonged forward, between the middle coxæ and forked, its hind one strongly notched to receive the ventral spine. (Fig. 35, *a*).
Tribe IV. EDESSINI, p. 176.

Tribe I. SCIOCORINI Amyot & Serville, 1843, 118.

This tribe, as characterized in the key, is represented along the northern border of the United States by a single introduced European genus and species.

I. SCIOCORIS Fallen, 1829, 20.

Small, broadly oval, strongly flattened species having the head as wide as base of scutellum, its apex broadly rounded; cheeks strongly flattened and meeting in front of tylus; ocelli very small; pronotum with side margins broadly rounded, entire; scutellum reaching middle of abdomen, its apex rounded; connexivum very wide, almost wholly exposed.

53 (79). *SCIOCORIS MICROPHthalmus* Flor, 1860, 114.

Broadly oval, strongly depressed. Upper surface and sterna beneath dull yellow, thickly marked with fuscous punctures, these in places aggregated to form small blotches; connexivum alternated with dull yellow and fuscous; membrane hyaline, the veins dusky; antennae reddish-brown, the apical joints darker; legs yellow dotted with fuscous; abdomen fuscous, irregularly mottled with paler. Antennae slender, joint 2 slightly longer than 3, 4 and 5 subequal, each a little longer than 2. Membrane usually slightly exceeding tip of abdomen. Length, 5 mm. (Fig. 19).

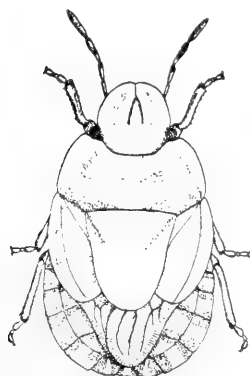


Fig. 19. X 8. (After Parshley).

Indian Lake, Sabael, N. Y., Aug. 20 (Barber). A palæarctic species ranging in this country from Maine westward, north of latitude 42°, to North Dakota. Stoner and Hussey have both recorded it from Douglas Lake, Mich., where it was taken by sweeping weeds and grasses along the edge of a woodland stream.

Tribe II. HALYINI Stal, 1854, 233.

This tribe is represented in the Old World by numerous genera, but only one is found in North America. This is the *Brochymena* of Amyot and Serville, a typical American genus containing a dozen or more closely related species, nine of which occur in the eastern states. They are commonly known as "tree bugs."

I. *BROCHYMENA* Amyot & Serville, 1843, 106.

Large, broadly oval, subdepressed species having the head porrect, its sides straight; cheeks flattened or slightly concave, equalling or surpassing tylus, the side margin of each usually with a more or less deep emargination near apex, this forming a projecting tooth or spine; antennae slender, longer than head and thorax, inserted beneath cheeks some distance in front of eyes; beak reaching or surpassing base of second ventral, its second and third joints subequal, the fourth one-third shorter. Pronotum subhexagonal, its front half narrower and on a lower plane than hind one, its surface very uneven and side margins with 4—8 strong teeth; hind portion elevated, its humeral angles prominent, strongly projecting; disk rugose, coarsely

irregularly punctate. Scutellum with basal fourth more or less convex, as wide as central hind margin of pronotum, thence flattened and strongly tapering to a rounded apex. Elytra almost wholly exposed. Connexivum flattened, widely exposed. Under surface with a median groove, distinct and deep the length of beak, then gradually evanescent and obsolete on fifth or sixth ventral.

KEY TO EASTERN SPECIES OF BROCHYMENA.

- a.* Humeral projection of pronotum subquadrate, truncate and armed with several large acute teeth; scutellum with basal fourth distinctly transversely elevated.
- b.* Color above brownish-yellow tinged with fuscous; antennæ piceous with incisures only of the segments pale; mesosternum with a transverse black spot; cheeks surpassing tylus (fig. 18, *c*).
54. ARBOREA.
- bb.* Color above pale grayish-yellow; basal fourth or more of each antennal segment pale; mesosternum without a black spot; cheeks reaching tip of tylus.
55. POEYI.
- aa.* Humeral projections of pronotum subtriangular or rounded, not or very bluntly toothed; scutellum not conspicuously elevated at base.
- c.* Cheeks distinctly longer than tylus, incurved but usually not contiguous before its apex; second joint of antennæ shorter than third.
56. QUADRIPUSTULATA.
- cc.* Cheeks equalling or but slightly exceeding tylus, in the latter case their tips usually parallel, not incurved.
- d.* Side margins of pronotum behind the sinus entire, unarmed; before the sinus rounded, white-calloused and obtusely dentate; front portion of pronotum with a deep median impression each side of base of which is a large elevated irregular ivory-white smooth space; basal angles of scutellum each with a similar smooth space surrounded by very coarse black punctures.
57. MYOPS.
- dd.* Side margins of pronotum distinctly toothed before and behind the sinus; pronotum and scutellum without ivory-white smooth spaces as in *d*, or, if present, small and indistinct.
- e.* Second joint of antennæ longer than third.
- f.* Apex of head triangular, much produced in front of the sinus of cheeks; humeral projections of pronotum broad with their tips rounded; color above black with numerous smooth yellow markings; length 17 or more mm.
58. CARIOSA.
- ff.* Apex of head subtruncate, but little produced in front of sinus of cheeks, the latter almost obsolete; humeral projections of pronotum triangular, their tips subacute; color above grayish-yellow with numerous white and black punctures; length, 13—15 mm.
59. PALLIDA.
- ee.* Second joint of antennæ distinctly shorter than third.

- g.* Head produced and triangular in front of sinus of cheeks, the tooth of latter prominent; connexivum with alternate pale and black spots; length not over 18 mm. 60. CAROLINENSIS.
- gg.* Head but little if at all produced in front of its lateral sinus, the latter either wanting or with tooth obtuse.
- h.* Length, 15—17 mm.; lateral sinus of cheeks obsolete; connexivum conspicuously alternated with black and red. 61. PUNCTATA.
- hh.* Length, 20 or more mm.; lateral sinus evident, its tooth blunt; connexivum fuscous with incisures and entire outer edge dull yellow. 62. MARGINELLA.
- 54 (81). BROCHYMENA ARBOREA (Say), 1825, 311; II, 239.

Broadly oval, subdepressed. Dull brownish-yellow thickly marked with fuscous punctures; pronotum with a fuscous blotch in each anteapical depression; elytra and scutellum with a few small scattered elevated smooth yellow spots; each segment of connexivum with a blackish crossbar across the ends, the middle pale; under surface and legs dull yellow, the latter annulate with black. Head with cheeks passing the tylus but not incurved in front of them, subapical sinus deep, rounded, the teeth prominent, triangular, directed forward and outward; joints 3—5 of antennae subequal in length, each one-third longer than second. Front side margins of pronotum with four or five rather large triangular teeth and one or two smaller ones between them. Scutellum with a low median lengthwise ridge, the tip bluntly rounded and impressed. Paired basal plates of female genital segment strongly convex, declivent behind. Length, 12—17 mm.; width, 8—10 mm.

Frequent in the southern half of Indiana, April 29—Oct. 20; not taken by me in the northern counties. Beaten from foliage of wild grape and apple and taken Oct. 20 from beneath bark of oak log. Dunedin, Moore Haven and R. P. Park, Fla., Nov. 17—April 13 (*H. S. B.*). Recorded also from numerous other points in that State. Both adults and nymphs were beaten from cypress at R. P. Park in December. Its known range extends from Ontario and New England west to Kansas and southwest to Florida, Texas and Old Mexico. In the north it appears to be most frequent in wooded hilly regions and may often be noted in late autumn sunning itself on the boles of oak, beech and other trees with whose bark it harmonizes in hue. In this species and the next the abdomen appears to suddenly widen opposite the middle of scutellum, the connexivum being from there on apparently wider and more exposed than in the species under *aa.* of the key.

- 55 (83). BROCHYMENA FOEYI (Guerin), 1857, 365.

Form of *arborea*, averaging somewhat larger. Above pale grayish-yellow marked with fuscous punctures which are aggregated to form

small blotches on elytra, also with numerous small irregular smooth yellow spaces on scutellum and elytra; membrane of elytra pale with numerous narrow reticulate fuscous lines between the main veins; beneath uniform pale dull yellow. Head with cheeks equalling, but not surpassing tylus, subapical sinus less deep than in *arborea*, nearly rectangular, the tooth small and meeting the cheek almost at right angles. Front side margins of thorax with six to eight teeth, these longer and more acute than in *arborea*. Scutellum with median central ridge, shorter and less convex, the impression near apex less evident. Other characters as given in key. Length, 12—19 mm.; width, 8—10 mm.

Dunedin and Cape Sable, Fla., Dec. 15—Feb. 29. Beaten from foliage of deciduous trees along the borders of wet hammocks. Recorded also from Biscayne Bay, Tampa, Orlando and Big Pine Key, Fla. A West Indian species described from Cuba and known in this country only from southern Florida.

56 (85). *BROCHYMENA QUADRIPISTULATA* (Fabricius), 1775, 704.

Oval, subdepressed, narrower behind than *arborea*. Above dull reddish-brown, thickly marked with small fuscous punctures and sparsely so with small irregular smooth white spaces, the pronotum and scutellum



Fig. 20, X 3. (After Lugger).

also with a few much coarser and deeper widely scattered black punctures; antennæ piceous, the tip of segments two and three paler; each segment of connexivum with two blackish bars; under surface dull yellow; femora and tibiæ dull red, annulated with black; tarsi piceous, the second joint often paler. Head with cheeks curved upward, much longer than tylus, their tips obtusely rounded, the anteapical sinus shallow, almost rectangular. Pronotum with humeri obtusely triangular, their front edge rounded; front side margins with 6—10 teeth, these shorter and more irregular in length than in *arborea*. Scutellum with apical two-thirds somewhat broader and less rapidly tapering than there, its median ridge less evident. Osteole distinct in the form of a short tube with terminal auricle and surrounded by a smooth pale area. Female with apical dorsal segment of abdomen truncate and basal plates of genital segment slightly convex, feebly declivent behind. Length, 14—18 mm.; width, 8—11 mm. (Fig. 20).

Common in southern Indiana, apparently less so in the northern counties, Feb. 14—Dec. 8. Occurs on the foliage of various

trees and shrubs and in cool rainy weather in summer and fall congregates in small colonies beneath loose bark or other shelter. Hibernates as imago beneath bark and logs, lying dormant for months with antennæ folded back along the breast; frozen solid during zero weather, then—its circulating fluid again brought into motion by the genial sunshine of spring—creeping forth to find for itself a mate and perpetuate its kind.

Dunedin, Fla., March 18, one specimen; recorded also from Pablo Beach, Lagrange and Enterprise, Fla., but much less frequent in that State than farther north. Sherborn, Mass., Oct. 25 (*Frost*). Ranges from Quebec and New England across the continent to California, Utah and Arizona, being most abundant in the States north of latitude 37 degrees. Hart (1919, 173) states that in Illinois: "It rests on the branches of trees protected by its color. We have found it on elm and grape, but it has been noted especially in orchards on apple and cherry trees. Sanderson has recorded it as preying on the tussock and brown-tail moths; but its abundance in all stages on trees suggests that it may also feed on the sap; . . . as it has been found very abundant on apple trees injured by twig punctures." Howard (1895, 47) records the receiving from Virginia of specimens of a large Pentatomid bug (*Brochymena annulata* Fabr.=*B. quadripustulata* Fabr.) which had attacked the new growth of apple trees in May, pumping up sap from the tender wood, many twigs and limbs being killed. Brimley (1907, 441) found it "very common in North Carolina under bark of dead pine in company with wasps of the genus *Polistes*."

The eggs of this and allied species of Pentatomids are, in form and structure, very interesting and attractive little objects. A cluster of 44 from which the young of *quadripustulata* were just emerging, was found July 23 in a dense woodland near Indianapolis. The eggs were set closely together in rows on the under side of a leaf of skullcap, *Scutellaria nervosa* Pursh., each one having its lower end attached by a glutinous secretion to the leaf. The shells were pure white in color, of a minutely granulated texture and cup-like in form, each being slightly constricted near its upper end with the rim very finely, evenly and prettily ciliated. The closely fitting top was circular and feebly convex and was being pushed upward and backward, as if on a hinge, by the very homely little bugs as they emerged to get their first glimpse of the great out-of-doors.

57 (84). *BROCHYMENA MYOPS* Stal, 1872, 16.

Broadly oval, subdepressed. Above dull grayish-yellow, marked with numerous very coarse black punctures, these in part aggregated on pronotum to form four ill-defined black stripes separated by narrow, smooth or sparsely punctate, ivory-white lines or spaces, the median one of which is much the broader; scutellum with three vague irregular ivory-white stripes bordered by black punctures, these white markings in addition to those mentioned in key; cheeks and tylus each with an irregular, median yellowish-white line, these continued back onto occiput; basal part of costal border of elytra in great part ivory-white; connexivum mostly black, the narrow outer edge and a spot at middle of each segment pale; under surface piceous, paler along the middle, the thoracic pleura with scattered pale dots; legs black or piceous, the middle of each tibiæ broadly white. Cheeks slightly surpassing tylus, their tips acute, the outer apical sinus and tooth very obtuse. Antennæ black, joints 2—5 subequal, or the second a little shorter. Beak reaching middle of third ventral. Pronotum with front margin of humeral projections obliquely subtruncate, their apex obtuse; side margins in front of sinus as in key, either coarsely crenulate or bearing 6—8 short, even blunt teeth; disk very uneven, the median lengthwise impression broader and deeper than in any of our other species. Scutellum relatively long and narrow, its apex narrowly rounded. Elytra with punctures much smaller than those of pronotum, irregularly placed and in part aggregated thus giving the surface a mottled appearance. Osteole with both tube and auricle very short, not surrounded by a smooth paler area. Abdomen with median groove reaching sixth ventral. Female with last dorsal squarely truncate. Length, 18—22 mm.; width, 9.5—11 mm.

Raleigh, N. Car., February—April; “rather common and hibernating under the bark of dead dry pines” (*Brimley* Ms.). Ranges from North Carolina to Texas and Mexico; not as yet recorded from Florida, but probably occurs in the northern portion of that State. Stal’s types were from New Orleans and Mexico and his description very insufficient. It is one of the largest and the most strikingly colored of our *Brochymenas*, and is more closely related to *cariosa* and *carolinensis* than to *quadripustulata*.

58 (88). *BROCHYMENA CARIOSA* Stal, 1872, 17.

Broadly oval, subdepressed. Above blackish, feebly shining, the pronotum and scutellum thickly marked with intermixed coarse and fine punctures, also with numerous smooth elevated more or less reticulated yellow spaces, these in part aggregated to form an irregular median stripe and two spots on pronotum, an irregular spot near base of each elytron and another near apex of scutellum; antennæ piceous, the incisures pale; under surface with sides black, the middle dull yellow, more or less mottled with black, the narrow edge of metapleura and a spot at

middle of side margin of each ventral segment yellow; legs black, annulate with yellow. Head elongate, the cheeks equalling or very slightly surpassing tip of tylus, the anteapical sinus very shallow, its tooth very small; beak reaching middle of third ventral. Pronotum with humeral projections thick, rugose above, their tips rounded and bearing three or four short, blunt teeth; front side margin armed with 4—6 very short teeth. Scutellum as in *quadripustulata*. Connexivum narrowly exposed, marked as in that species. Osteole as there, but not surrounded by a smooth pale area. Male with anal segment deeply emarginate, its hind margin retuse and ciliate. Female with last dorsal deeply and widely emarginate. Length, 17—19 mm.; width, 10—12 mm.

Moore Haven, Fla., March 23. Recorded also from Tampa and Biscayne Bay, that State. Ranges from southern Illinois (Hart, 1919, 173), Tennessee and Arkansas, south to Florida, Louisiana and Texas.

59 (—). *BROCHYMENA PALLIDA* sp. nov.

Oval, subdepressed, small for the genus. Grayish-white marked with numerous small fuscous punctures; pronotum and scutellum with a number of widely scattered coarse, deep black punctures, these aggregated to form an oval spot at each basal angle of scutellum; also with numerous elevated smooth white spots, the most conspicuous of these being near middle of front lobe of pronotum and each side of base of scutellum; antennæ dark reddish-brown; connexivum with alternate bars of fuscous and pale gray; under surface dull grayish-white with scattered very small fuscous punctures and thickly clothed with a white hair-like bloom; legs dull yellow, mottled with purplish dots. Head relatively short, its apex obtusely angled or subtruncate, cheeks reaching tip of tylus; subapical sinus and tooth scarcely evident. Beak reaching base of second ventral. Bucculæ without a preapical tooth. First antennal reaching the sinus of cheeks, second one-fourth longer than third. Side margins of pronotum armed both before and behind the sinus with short, regular subacute teeth. Scutellum shorter and more rounded at apex than in *carolinensis*. Osteole with tube shorter, its auricle smaller than in the two preceding species. Genital segment of male short, shallowly emarginate behind, the notch with a short median lobe. Lateral lobes of female genital plate distinctly surpassing the oblong median lobe. Length, 13—15 mm.; width, 7—9 mm.

Sanford, Fla., March 25; one pair beaten from foliage of oak. Allied to *punctata* Van D., but smaller, the general color much paler, the second antennal longer than third, the lobes of female genital different. The punctures of upper surface are of two sizes, the more numerous ones very small and enclosing a whitish bloom, the larger black ones much fewer and widely scattered.

60 (89). *BROCHYMENA CAROLINENSIS* (Westwood), 1837, 22.

Broadly oval, subdepressed. Above dull grayish-yellow, thickly marked with numerous fuscous and blackish punctures, the blackish ones much the larger and aggregated to form two dark spots on declivity of pronotum and a curved line near each basal angle of scutellum, this bordered each side by a smooth yellow line; pronotum and scutellum with a few irregular smooth yellow areas and a small one near apical fourth of elytra; antennæ dull brown, the incisures paler, the second joint but little more than half the length of third; under surface fuscous along the sides, dull yellow at middle; legs fuscous, annulate with yellow. Cheeks wide, but slightly passing tip of tylus, the anteapical sinus deep, rounded, the tooth prominent; beak reaching middle of third ventral. Pronotum with front of basal portion strongly declivent, humeral angles subtriangular, rounded in front, unarmed or with a few blunt teeth, separated from the disk by a wide shallow oblique groove; front side margins curved and armed with 6—10 short, broad quite regular teeth. Scutellum with surface more uneven than in preceding species, its central ridge prominent. Osteolar tube very short, its opening oblique and auricle slender. Genital plate of male very widely and deeply emarginate, its deflexed hind margin concave at middle. Length, 14—18 mm.; width, 9—11 mm.

Sanford, Bassenger, Sarasota and Dunedin, Fla., Jan. 14—April 5; recorded also from numerous other localities in that State. Ranges from New England and New York southwest to southern Florida, but northward it is not definitely known west of the Allegheny Mountains. About Dunedin it hibernates beneath bark and in bunches of Spanish moss, and is sometimes attracted by porch light. It is a broader species than *quadripustulata*, with less projecting cheeks, longer beak, more distinct median abdominal groove and more numerous and regular teeth on the rounded side margins of pronotum. This species has been usually known in literature as *B. annulata* (Fabr.), but according to Van Duzee, that name was pre-occupied.

61 (90). *BROCHYMENA PUNCTATA* Van Duzee, 1909, 369.

Broadly oval, strongly depressed. Dull reddish-brown thickly marked with fuscous punctures and smooth white elevations of varying size and shape; teeth of side margins of pronotum, oblique smooth elevation at each basal angle of scutellum and middle of each connexival and incisures, orange-red; elytra with numerous small rounded ivory-white elevations; under surface dull yellow, irregularly dotted with rather large fuscous punctures; legs with brown dots. First antennal almost reaching apex of head, second two-thirds the length of third, 3—5 subequal. Bucculæ with distinct preapical tooth. Beak

reaching base of third ventral. Cheeks slightly surpassing tylus, their tips incurved and almost contiguous in front of it. Pronotum with humeral projection obtusely triangular; side margins armed with blunt irregular teeth, those behind the sinus smaller, their tips inclined backward; disk with numerous coarse black punctures aggregated along the submargins and in the depressions of apical half; also with numerous very irregular smooth whitish elevations. Scutellum with an obtuse longitudinal median ridge, the coarse black punctures filling the depression of each basal angle. Female with median oblong lobe of genital plate longer than the lateral lobes. Length, 15—17 mm.

Crawford Co., Ind., Aug. 31. The first record for that State, it being hitherto known only from Georgia and Virginia. "The short, square head, white points on elytra and imperfect white points and black pits on pronotum and scutellum will distinguish this species." (*Van Duzee*).

62 (91). BROCHYMENA MARGINELLA Stal, 1872, 16.

Broadly oval, subdepressed. Head, pronotum and scutellum with numerous elevated, calloused dull yellow lines or areas, between which are coarse fuscous punctures, the pale areas on cheeks, middle of pronotum and sides of scutellum more or less transverse; corium and costal area with smooth elevations less prominent and paler, the punctures with a grayish bloom; basal two-thirds of membrane grayish-white with brownish veins, apical third with veins and scattered dots fuscous; legs fuscous-brown, tibiæ with a broad median yellowish ring; tarsi fuscous, their margins with a dense fringe of pale yellowish hairs. Joint 2 of antennæ two-thirds the length of 3. Cheeks reaching and slightly overlapping tip of tylus, their lateral sinus evident and obtuse. Pronotum with humeral angles obtuse, sinus shallow, scarcely evident, margins in front of it with six or eight short, regular blunt teeth, behind it with three or four still shorter ones. Beak reaching middle of third ventral. Length, 21 mm.

Harris County, Tex., March (*Van D.*). Recorded only from Florida and Texas. A specimen from Florida, without definite station, is in the Osborn collection.

Tribe III. PENTATOMINI Stal, 1872c, 37.

This tribe, as characterized under the subfamily heading and in the tribal key, is represented in the eastern states by no fewer than 25 nominal genera, some of them, however, being very closely related. I have therefore, to shorten the generic key, divided them into three groups or subtribes, each one being treated in its proper sequence.

KEY TO SUBTRIBES OF PENTATOMINI.

- a. Second ventral at middle not produced forward in a stout spine or tubercle.
- b. Osteolar opening without a distinct auricle, but extended as a narrow tapering evanescent canal. SUBTRIBE I, p. 104.
- bb. Osteolar opening usually with a short curved auricle having a rounded tip, but not extended as a canal, or if so, the canal very short and ending abruptly. SUBTRIBE II, p. 120.
- aa. Second ventral at middle produced forward in a stout spine or tubercle towards or between the hind coxæ. SUBTRIBE III, p. 156.

SUBTRIBE I OF PENTATOMINI.

Pentatomids varying much in size, but all having the body oval, obtuse behind; cheeks except in *Peribalus*, not or scarcely longer than tylus; pronotum with side margins entire and humeral angles obtusely rounded, never spined (except in some species of *Thyanta*); osteolar opening extended as a gradually evanescent canal; second ventral without a forward projecting tubercle or spine. Five of our 25 eastern genera of Pentatomini belong in this group.

KEY TO EASTERN GENERA OF SUBTRIBE I OF PENTATOMINI.

- a. Cheeks distinctly longer than tylus and usually contiguous in front of its tip; pronotum with narrow smooth ivory-white margins; length less than 10 mm. I. PERIBALUS, p. 105.
- aa. Cheeks not or scarcely longer than tylus; sides of pronotum not edged with white.
- b. Osteolar canal not extending beyond middle of its supporting plate; upper surface, except in *Chlorochroa*, not finely densely rugosely punctate.
- c. Body beneath, especially the sides of abdomen, distinctly pubescent; cheeks each with a raised pale line along the middle; frena not reaching middle of scutellum; smaller, not over 8 mm. II. TRICHOPEPLA, p. 107.
- cc. Body beneath not pubescent; cheeks without a pale median ridge; frena extending beyond middle of scutellum; larger, length 10 or more mm.
- d. Second and third joints of beak usually subequal in length, fourth shorter; head longer than wide; color dull greenish-yellow. III. RHYTIDOLomia, p. 109.
- dd. Second joint of beak distinctly longer than third, the latter subequal to fourth; head, including eyes, as wide or wider than long; color clear green. IV. CHLOROCHROA, p. 111.
- bb. Osteolar canal continued as a ridge which extends obliquely to the outer front angle of the supporting plate; upper surface finely, densely rugosely punctate. V. THYANTA, p. 113.

I. PERIBALUS Mulsant & Rey, 1866, 262.

Small oval, subdepressed species, having the head flat, as broad across the eyes as long, rounded in front, its margins feebly sinuate in front of eyes; pronotum with side margins straight, not reflexed, humeral angles obtusely rounded; scutellum nearly equilateral, its apex rounded and, in our eastern species, with a pale tip; connexivum narrowly exposed; osteolar canal extended obliquely as a ridge along the front margin of and to beyond the middle of its supporting plate; genital plate of male semicircular, broadly emarginate at middle, its outer apical angles usually ending in short oblong, bluntly rounded lobes. Other characters as given in key. Five species have been recorded from the United States, two of which occur in our territory.

KEY TO EASTERN SPECIES OF PERIBALUS.

- a.* Under surface pale; connexivum with a narrow pale outer border; tip of scutellum narrowly rounded; cheeks usually contiguous in front of tylus. 63. LIMBOLARIUS.
aa. Under surface piceous; connexivum with black spots on the incisures reaching nearly to the edge; scutellum wider, its tip broadly rounded; cheeks not contiguous in front of tylus. 64. PICEUS.

63 (94). PERIBALUS LIMBOLARIUS Stal, 1872, 34.

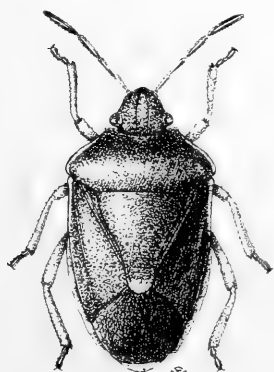


Fig. 21, X 5. (Original).

Dull grayish yellow, thickly marked above with fuscous punctures; narrow edges of side margins of pronotum, basal third of costal margin of elytra, edge of connexivum and apex of scutellum ivory-white, impunctate; membrane of elytra fuscous; antennæ with joints 1—3 reddish-yellow, outer two joints piceous; under surface yellow with numerous fine remotely placed darker punctures; legs yellow with small purplish dots. Form more depressed and narrower behind than in *piceus*. Genital plate of male strongly declivent, its ends deeply and narrowly cleft or notched to form two nearly equal oblong lobes. Length, 7—8 mm.; width, 4.3—4.8 mm. (Fig. 21).

Frequent throughout Indiana, apparently more so in the southern portion, Feb. 2—Oct. 16 (*H. S. B.*). Sherborn, Mass., Oct. 25 (*Frost*). Occurs in summer and autumn on flowers of goldenrod and other Compositæ, especially those growing in alluvial soils or along the margins of ponds; also on shepherd's

purse, *Bursa bursa-pastoris* L. Hibernates in winter beneath logs, mullein leaves, the bottom rails of old fences and other convenient hiding places. Ranges from Ontario and New England west across the continent and southwest to Georgia, Texas and Old Mexico. Not as yet recorded from Florida, though it probably occurs in the northern portion of that State. The upper surface varies considerably in hue, some specimens being very dark, due to the greater density of the fuscous punctures. In two examples at hand from Mississippi the cheeks, while longer than tylus, are not contiguous in front of it.

Of its occurrence in Illinois, Hart (1919, 185) says: "It is particularly a late summer and fall species. We have taken it in January, March, April and May, but especially from June 19 to Nov. 7, the largest number of captures being in October. The nymphs were taken during the summer months. At Urbana, Oct. 26, twenty-three adults were found on a single cauliflower stalk with their beaks inserted, evidently sucking the sap." Zimmer (1911, 223) states that in Nebraska: "This is our most common Pentatomid in the eastern part of the State. In autumn it is almost impossible to sweep a patch of grass or weeds without getting a net full of these insects."

64 (96). *PERIBALUS PICEUS* (Dallas), 1851, 236.

Oval, subconvex, broadest behind the middle of abdomen. Above dull brownish-yellow, thickly marked with piceous punctures, those on head, front of pronotum and basal half of scutellum larger and more or less confluent, causing these parts to appear almost black in hue; pale border of pronotum narrower, and that on apex of scutellum smaller than in *limbolarius*; segments of connexivum black with narrow pale outer edge and median square dull reddish spot. Under surface piceous, paler along the middle, the middle of lateral margin of each ventral reddish-yellow; legs dull yellow with piceous dots and blotches. Cheeks with side margins distinctly sinuate in front of eyes, their tips longer than tylus, their surface coarsely rugosely and confluent punctate. Pronotum with a distinct but ill-defined median transverse groove, the front portion more convex and less declivent than in *limbolarius*; disk with humeral angles subacute, and with a wide rather deep submarginal impression each side. Scutellum with apical two-thirds wider and less tapering behind than there. Male with genital plate longer, almost perpendicular, its ends with a shallow U-shaped emargination, the resulting lobes short and broadly rounded. Length, 8.5—9 mm.; width, 5.2—5.5 mm.

Northern Illinois, May 1 (*Hart*). Not as yet noted though probably occurs in northern Indiana. Known elsewhere from

Hudson's Bay (type), Ontario, Iowa, Colorado and Montana. The two specimens at hand have the cheeks distinctly longer than tylus "but not meeting in front of it, the apex of the head distinctly emarginate;" just as stated by Dallas in his original description. They therefore should be placed in a different genus or subgenus, probably the *Holcostethus* of Fieber. Nothing regarding its habits has as yet been recorded.

II. TRICHOPEPLA Stal, 1867, 528.

Small, oval subdepressed pilose species, having the head convex, feebly declivent, narrowed in front, cheeks equalling tylus, their side margins acute, feebly sinuate; antennæ short, first joint not reaching apex of head, second one-half longer than third, fourth and fifth longer, stouter, subequal; beak reaching first ventral, its second joint as long as third and fourth united; pronotum convex, its front portion declivent, rugose, side margins entire, narrowly reflexed, humeral angles rounded; scutellum with sides sinuate, apex narrowly rounded, frena reaching its middle; connexivum narrowly exposed; osteolar canal attenuate, scarcely reaching middle of front border of its supporting plate. Two species are known, both of which occur in the eastern states. They are our only eastern Pentatomids having the body distinctly pilose-pubescent, though in a number of species the legs are pilose.

KEY TO SPECIES OF TRICHOPEPLA.

- a. Antennæ reddish-brown, the two apical joints piceous; head tapering in front, its apex narrowly rounded. 65. SEMIVITTATA.
- aa. Antennæ black, basal joint only paler; head with sides parallel, its apex broadly rounded. 66. ATRICORNIS.

65 (98). TRICHOPEPLA SEMIVITTATA (Say), 1832, 9; I, 322.

Ovate, subdepressed. Above, dull brownish-yellow, marked with numerous fuscous punctures, and irregular smooth elevated spaces, the punctures aggregated to form a dark stripe each side of tylus and fuscous or blackish blotches on front portion of pronotum and basal half of scutellum; a raised line along the middle of each cheek, the narrow reflexed margin of pronotum, basal third of costal margin of elytra, three short oblique stripes on base of scutellum and its extreme tip, dull yellow; connexivum alternated with black and yellow; under surface dull yellow, each side usually with a more or less evident rather broad fuscous stripe; legs yellow flecked with brownish dots. Tylus convex, dull red, continued to base of head by a smooth raised line. Pronotum with disk of basal portion mostly smooth, but with scattered coarse punctures;

sides of front portion obliquely declivent, shallowly impressed. Other structural characters as above given. Length, 6—8 mm.; width, 4.5—5 mm.

Found throughout Indiana, but more common in the southern portion, May 21—Sept. 29. Feeds on plants of the Umbelliferæ family, mainly the wild carrot, *Daucus carota* L., and the button snake-root, *Eryngium aquaticum* L. The latter plant occurs on wet prairies, and near Heckland, Vigo Co., in September, I once found this bug by hundreds in all stages on its heads and in the angles of its leaves.²⁶ The known range of *semivittata* extends from Montreal, Canada, and New England west to Colorado and south and southwest to northern Florida, Texas and Mexico. I have not taken it in Florida, and the only definite locality records from that State are Crescent City, April, by Van Duzee (1909, 154), and St. John's Bluff, the type locality of *Pentatoma pilipes* Dallas (1851, 247), a synonym of *semivittata*. Van Duzee (1904, 34) states that he "once found this insect in large numbers on carrot blossoms in a waste field near Buffalo, N. Y., as late as Nov. 3. They were in all stages of development and the imagoes were blackish at first with the connexivum margined with pale. After they attained full maturity they assumed their ordinary pale color with the connexivum maculated."

66 (99). TRICHOPEPLA ATRICORNIS Stal, 1872, 34.

Broadly oval, subdepressed. Dull grayish-yellow marked with fuscous punctures, these fewer and smaller than in *semivittata*, forming dark stripes only on head, and blotches in anterior depressions of pronotum and on base of scutellum; yellow stripes of cheeks less elevated and not quite as distinct as there; smooth raised yellowish areas much fewer, evident only on disk of basal portions of pronotum and scutellum; tip of scutellum narrowly pale, but punctured with fuscous; under surface yellow, the abdomen often darker on sides; legs reddish-yellow obscurely dotted with brownish; tarsi and tip of beak fuscous. Head broader in front of eyes and less tapering than in *semivittata*; pronotum wider with sides of disk less declivent and lateral margins less oblique; scutellum with apical half wider and tip more broadly rounded; elytra alutaceous, more finely and sparsely punctate. Length, 7—8 mm.; width, 4.5—5 mm.

Argo, Ill., July 24 (*Gerhard*). Mariposa Grove, Cal., May 14 (*Ill. Nat. Hist. Surv. Coll.*). Described from Wisconsin and Illinois. Ranges from there west to British Columbia, Alaska and California. Uhler (1877, 403) says of it: "Broader and

²⁶See Canadian Entomologist, XXVIII, 1896, 266.

more regularly oval than *semivittata*, and belongs more particularly to the north and west of North America than that species." Van Duzee (1916d, 231) mentions it as "found occasionally on rank weeds about the lower end of Fallen Leaf Lake, Cal., July 17." Stoner found it at Iowa City, Ia., July 9, on wild carrot, *Daucus carota* L., growing within the city limits. The black antennæ and more widely rounded apex of head readily distinguish it from *semivittata*.

. III. RHYTIDOLOMIA Stal, 1872, 33.

Medium or large elongate-oval or broadly oval subdepressed species having the head as long or slightly longer than wide, porrect or a little declivent; cheeks broad, slightly concave above, equalling or feebly surpassing tip of tylus (fig. 18, *d*); tubercles at base of antennæ ending in a short curved spine; bucculæ narrow, parallel, their front edge dilated into a small rounded lobe (fig. 18, *a*); beak reaching base of second ventral; pronotum with front half on a slightly lower plane, humeral angles broadly rounded, side margins straight, entire; scutellum with apical half rapidly tapering to a rounded apex; connexivum narrowly or not at all exposed; osteolar canal short, tapering, not reaching the middle of its supporting plate. Three of the six species recognized in the Van Duzee Catalogue occur in the eastern states.

KEY TO EASTERN SPECIES OF RHYTIDOLOMIA.

- a.* Second joint of antennæ but slightly longer than third, side margins of pronotum not reflexed; second joint of beak almost as long as third and fourth united; smaller, not over 11 mm. 67. SAUCIA.
- aa.* Second joint of antennæ distinctly longer than third; side margins of pronotum narrowly sharply reflexed; second and third joints of beak subequal, each one-half longer than fourth; larger, 14 or more mm.
 - b.* Form elongate-oval; color dark olive brown, the margins paler; width 8 mm. 68. SENILIS.
 - bb.* Form broadly oval; color olive-green, the costal border of elytra beyond the middle blackish; width, 10 mm. 69. BELFRAGIL.

67 (101). RHYTIDOLOMIA SAUCIA (Say), 1831, 6; I, 318.

Elongate-oval, subdepressed. Dull olive-green, costal border of elytra dull yellow bordered within by a blackish line; pronotum and scutellum with a narrow median dull yellow line; first and second joints of antennæ and basal half of third, reddish-brown, remainder fuscous; legs greenish-yellow to fuscous, the basal half of femora paler. Entire

upper surface coarsely, sparsely and irregularly punctate. Cheeks reaching tip of tylus. Pronotum with a vague transverse impression before the middle, the basal side margins sinuate. Scutellum reaching to apical third of abdomen, its apex rather narrowly rounded. Under surface with pleura coarsely punctate, ventrals more finely and shallowly so. Length, 10—12 mm.; width, 6—6.5 mm.

Dunedin, Fla., March 24 (*H. S. B.*); one specimen swept from tidewater marshes. Long and Staten Islands, N. Y., Sept. 19—21 (*Davis*). A subarctic species occurring mainly in the salt marshes along the Atlantic coast from New England to Florida. Say records it from Florida and Van Duzee on March 28 swept a few adults and young from the tall marsh grasses on the shore at St. Petersburg. Recorded also from Charlotte Harbor, that State. Bueno (1910, 24) reports both adults and nymphs as occurring, July 17, at Rye Beach, Westchester Co., N. Y., on a fine grass growing in the higher parts of the salt marsh. On Sept. 20 Davis (*Ms.*) found them numerous and flying about the edges of salt meadows at Watchogue, Staten Island, and on Oct. 12 found specimens beneath boards, so that the adults probably hibernate in that vicinity.

68 (102). *RHYTIDOLOMIA SENILIS* (Say), 1831, 5; I, 316.

Elongate-oval, subdepressed. Dark olive-brown, the narrow side margins of head, pronotum and connexivum dull yellow; antennæ reddish-brown, the last two joints dusky; under surface and legs reddish-brown, the sides of abdomen, tarsi and tip of beak darker. Surface, both above and beneath, with numerous small, transverse, more or less anastomosing wrinkles, these enclosing numerous small punctures. Abdomen with much finer wrinkles, almost impunctate. Cheeks very slightly longer than tylus. Second joint of antennæ one-fourth longer than third. Length, 16—17 mm.; width, 7—8 mm. (Fig. 18, *a* and *d*).

Staten Island and Bronx Park, N. Y., March 30—April 7 (*Davis*). Occurs with the preceding on salt marsh grasses along the Atlantic coast from New England to Virginia. The larger size, finely wrinkled upper surface and lack of submarginal dark stripe of elytra easily distinguish it from *saucia*.

69 (103). *RHYTIDOLOMIA BELFRAGII* Stal, 1872, 33.

Broadly oval, subdepressed. Dull greenish-yellow, the elytra and abdomen a clearer green; narrow margin of pronotum, basal half of costal border of elytra and a narrow median stripe on scutellum dull yellow; antennæ, except basal joint, apical half of costal border of ely-

tra, margins of apical third of scutellum and the tarsi blackish; membrane of elytra hyaline, its inner basal angle fuscous. Head wider and a little shorter than in *senilis*, its apex more broadly rounded, the cheeks just reaching tip of tylus. Head, pronotum, basal half of scutellum and thoracic pleura finely transversely rugose with numerous intervening rather coarse punctures; elytra and apical half of scutellum more finely and shallowly punctate; sides of ventral segments finely aciculate punctate, their middle almost smooth. Tibiæ deeply sulcate above. Apex of genital plate of male broadly shallowly concave with a small rounded median tooth, the outer angles obtuse. Length, 13—16 mm.; width, 9—10 mm.

Northern Illinois, April (*Urbana* collection). A rare species, described from that State and definitely known elsewhere only from Iowa and Nebraska.

IV. CHLOROCHROA Stal, 1872, 33.

Broadly oval, convex species, having the head shorter and broader than in *Rhytidolomia*; cheeks very slightly longer than tylus; beak reaching hind coxæ, its second joint as long as third and fourth united; antennæ slender, second joint longest, one-half longer than third; pronotum with front portion strongly declivent, its front side margins distinctly reflexed; humeral angles rounded with an obtuse nodule above; scutellum broader at base than in *Rhytidolomia*, its apical portion shorter and tip more broadly rounded. Four

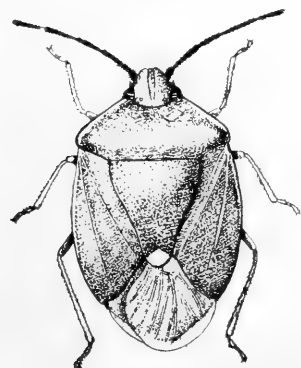


Fig. 22. *Chlorochroa ligata* (Say) X 3. (After Lugger).

of the nine known species occur in this country but only one in the eastern states.

70 (106). CHLOROCHROA UHLERI Stal, 1872, 33.

Broadly oval, subconvex. Above bright green fading to dull olive-green, narrow side margins of pronotum, basal half of costal border of elytra, entire connexivum and tip of scutellum either reddish or pale yellow; antennæ olive-green, the last two joints fuscous; under surface and legs olive-green, the tarsi and apical third of tibiæ fuscous. Upper sur-

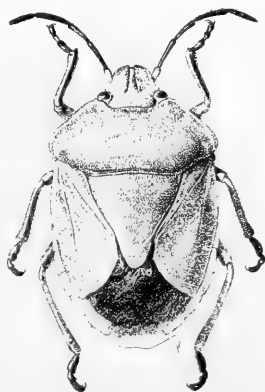


Fig. 23. X 3. (After Hart & Malloch).

face densely, rugosely irregularly punctate, the elytra more finely and evenly so; thoracic pleura rather coarsely irregularly punctate; abdomen finely aciculate-punctate, the middle third almost smooth. Head wider across the eyes than long, its apex broadly rounded. Other structural characters as given under generic heading. Length, 11—15 mm.; width, 7.5—8.5 mm. (Fig. 23).

Pine and Millers, Lake Co., Ind., July 5—Oct. 16; taken on juniper (*Gerhard*). Long Island, New York and Victoria, Vancouver's Island (*Davis*). Ranges from Quebec and New England across the northern United States to British Columbia and Alaska, and south in the western portion to California and Old Mexico, Stal's type being from the latter country. Hart (1919, 183) states that:

"It is exceedingly abundant in the Illinois Valley sand regions, swarming on the dwarf prickly-pear cactus, *Opuntia rafinesquii*, and feeding mostly at the tip of the fruits when these are present. I have also taken it in the sand dunes of the Chicago area on dwarf cedar, *Juniperus sabina* L. The dates are April 1—Nov. 17. Nymphs occurred June 6—Oct. 30. In the late fall most adults are a dark brownish carmine resembling that of the ripe fruit of the *Opuntia* on which they occur."

Vestal (1913, 29) says that "This is the characteristic Pentatomid of the sands in Illinois. It is a plant feeder and the adults pass the winter in sheltered places. In April they have been taken crawling about on the sand and also under cactus lobes and boards. It is a typical bunch-grass species." About Buffalo, N. Y., Van Duzee (1894, 171), found it "occasional on various trees and bushes, especially willows and junipers, May to October."

C. uhleri has been mentioned or treated by the authors of this country under several different names, chief of which are *Pentatoma juniperina* Linn., a European species, and *Chlorochroa persimilis* Horv., a synonym of *uhleri*.

V. THYANTA Stal, 1862, 58.

Medium or small sized species possessing the characters of the subfamily and subtribe, and having the body ovate or subovate, usually densely rugosely punctate; head porrect, usually slightly longer than wide, flat above, cheeks feebly sinuate in front of eyes, equalling or a very little shorter than tylus; beak reaching base of second ventral, its second joint equal to third and fourth united, the tip usually fuscous; pronotum with front

portion gradually declivent, humeral angles usually obtusely rounded, not prominent (spined in *perditor*), front side margins entire; scutellum reaching apical third of abdomen, gradually narrowing from the base; connexivum narrowly exposed; mesosternum finely carinate; osteolar canal long, narrowing and continued as a ridge to outer front angle of its supporting plate; tibiæ above almost flattened or feebly sulcate.

Twelve species are known from the United States, eight of which occur east of the Mississippi. They are all greenish or greenish-yellow in hue and very much alike in structure, their separation therefore very difficult.

KEY TO EASTERN SPECIES OF THYANTA.

- a. Third joint of antennæ not longer than second; ventrals, except in *rugulosa*) with a black dot near spiracles and a black point on incisures.
- b. Second joint of antennæ equal to or but little longer than third; length, 8 or more mm.
- c. Front side margins of pronotum broadly concave; humeral angles produced outward and slightly forward as acute spines. 71. *PERDITOR*.
- cc. Front side margins straight or nearly so; humeral angles rounded or obtusely angulated, rarely (in *custator*) spinose.
- d. Scutellum more elongated apically, its tip distinctly surpassing the inner apical angle of corium; form of body elongate oval; membrane of elytra uniform hyaline, rarely with a few fuscous dots; pronotum with edge of front side margins reddish or yellow.
- e. Pronotum and scutellum evenly, densely confluent punctate, with few or no transverse rugæ; disk of pronotum without black dots; larger, 11-12 mm. 72. *CUSTATOR*.
- cc. Pronotum and basal half of scutellum uneven, with numerous transverse rugæ enclosing or surrounding rather coarse punctures; front portion of pronotum usually with two small rounded black dots; length, 8-9 mm. 73. *CASTA*.
- dd. Scutellum with apical third broader and less elongated, its tip feebly surpassing the inner apical angle of corium; form of body more broadly ovate; membrane of elytra with numerous oblong black dots or dashes along the veins; pronotum with edge of side margins more or less blackish, the front portion of its disk with two black dots near middle; length, 9-10 mm.
- f. Corium without whitish spots; antennæ with fourth and fifth joints wholly or in great part fuscous; pronotum with front lateral margins always distinctly black, its disk with a broad purplish band between the humeral angles; connexivum wholly pale. 74. *CALCEATA*.

ff. Corium with numerous small distinct smooth whitish spots; antennæ pale throughout; pronotum with blackish edge of side margins narrow, often indistinct, its disk without a purplish transverse band between the humeral angles; connexivum with oblong black spots on the incisures.

75. ACCERRA.

bb. Second joint of antennæ distinctly longer than third; smaller, length not over 7 mm.

g. Pronotum without transverse rugæ but with a white or in part reddish band, scalloped behind, between the humeral angles; second joint of antennæ less than one-third longer than third; edge of connexivum and abdomen with black points on the incisures.

76. ANTIGUENSIS.

gg. Pronotum with transverse rugæ and without a whitish band between the humeral angles; second joint of antennæ one-half or more longer than third; connexivum and abdomen without black dots.

77. RUGULOSA.

aa. Third joint of antennæ longer than second; ventrals without black spots on sides or incisures; length less than 8 mm.

78. PSEUDOCASTA.

71 (157). THYANTA PERDITOR (Fabricius), 1794, 102.

Oval, subconvex. Above greenish or grayish-yellow, thickly punctate with small punctures, those on head and elytra grayish, on pronotum and basal half of scutellum more or less fuscous and often aggregated to form vague dark markings; antennæ with joints 1—2 greenish, basal halves of third and fourth reddish, remainder fuscous; humeral

spine, tip of scutellum and middle of margin of each connexival segment reddish; basal half of pronotum often with a reddish-purple band between the humeral angles; membrane hyaline without dark markings; under surface dull greenish-yellow, sparsely and finely punctate, the middle of side margins of each ventral reddish-yellow. Head with apex broadly rounded, cheeks reaching tip of tylus. Pronotum with front margin equal in width to head across the eyes; side margins broadly concave from front angles to tip of the acute forward inclined spine of hind ones; disk with short, fine oblique pale rugæ enclosing or surrounding the small punctures. Length, 9—13 mm.; width, 6—7 mm. (Fig. 24).

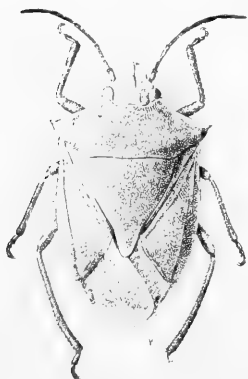


Fig. 24. X 5.
(After Hart & Malloch).

Royal Palm Park, Fla., Dec. 5—March 28; numerous specimens swept from herbage along roadsides and margins of everglades (*U. S. B.*). Nogales, Ariz., Aug. 12—24 (*Gerhard*). A neotropical species known definitely in this

country only from Florida, Texas and Arizona. Barber records it from Key Largo, Fla., and states: "I believe that this species is confined to the extreme southernmost part of Florida, although I have seen records from other parts of the State." The Arizona specimens at hand do not have the spiracles black or the edge of the abdomen with conspicuous black points as mentioned by Van Duzee (1904, 53). In the Florida ones the points are present and there is a black dot behind each spiracle. Stal (1872, 34) records *perditor* from Mexico, Texas, Columbia and the East India Islands. It has been recorded by Uhler and others as far north as Savannah, Ga., and even North Dakota, but both Barber (1911, 109) and Van Duzee (1917, 52) state that these northern records probably refer to varieties of *custator*.

72 (158). *THYANTA CUSTATOR* (Fabricius), 1803, 164.

Elongate-oval, subconvex. Color exceedingly variable, olive-brown, pale green or greenish-yellow; antennæ with joints 1—3 pale green, often tinged with reddish, 4 and 5 usually more or less fuscous; pronotum with or without a reddish-purple band between the humeri, its front side margins, basal half of elytral costal border and tip of scutellum, pale green, yellowish or purplish red; membrane surpassing the abdomen, pale hyaline, rarely with a few fuscous dots near base; connexivum narrowly or not at all exposed, pale green or yellow, rarely alternated; under surface with sides green, the middle of abdomen and coxæ usually dull yellow; legs dull green, the tarsi and apex of tibiæ often fuscous; a black dot behind the spiracles and a black point on incisures of ends of ventrals often present. Head flat, about as wide across the eyes as long; tylus feebly convex, usually slightly longer than cheeks; antennæ slender, pubescent, joints 2, 4 and 5 subequal, each nearly one-third longer than 3. Pronotum with front half strongly declivent, side margins straight or very slightly concave, their edges a little roughened; humeral angles usually obtuse; disk uniformly densely confluent punctate. Scutellum as in key, its punctures arranged somewhat in a transverse row with very fine rugæ between them. Thoracic pleura coarsely irregularly punctate. Genital plate of male broadly emarginate, its lateral lobes somewhat flattened and divergent, their tips rounded, the small median lobe nearly straight-edged. Length, 10—12 mm.; width, 5—6.5 mm.

Frequent throughout Indiana, Jan. 16—Oct. 18. In spring and summer occurs on clover, grasses and other low herbs along the borders of meadows and cultivated fields, in autumn on the flowers of goldenrod and other Compositæ, especially those growing in moist grounds. In Vigo Co., on three occasions, it was taken in January from beneath the root leaves

of mullein. In Florida I have taken it by sweeping low herbage at practically all localities where collections have been made, it being, between November and April, one of the most common of the Pentatomids found in that State. Examples from there are in general more suffused with red and more often have the red band between the humeri and the black dots on spiracles and ventral incisures than those from Indiana.

T. custator is one of the most widely distributed of our Heteroptera, ranging from Quebec and New England to British Columbia, California, Texas, Arizona and Northern Mexico. Sanderson (1904, 94) says that in 1903 it occurred in northern Texas "in extraordinary numbers, where it seriously injured oats, corn and sorghum and was also in milo-maize and cow-peas." Morrill (1910, 86) states that in the cotton fields of Texas it is "commonly found feeding on the cotton squares and bolls, when thus feeding being completely hidden by the bracts." He also states that the average number of eggs per batch is 31.4 and the average incubation period, at a mean temperature of 79.3° F., is four days and fifteen hours. Hart (1919, 185) says that in Illinois "it feeds on asparagus, corn and various grasses. Collections in November and December indicate that hibernation in the adult stage is usual." Stoner (1920, 103) states that "At Iowa City we have usually found it in some numbers in any field of red clover, especially if the area was inclined to be a little moist, due to insufficient drainage."

On account of the great variation in color and the occasional projection of the humeral angles as a spine, *T. custator* has often been recorded as *T. perditor*. Barber (1911, 109) speaks of *custator* as a "very plastic and variable species," and says, "There is little doubt in my mind that it is specimens of this species with the spinose humeral angles which have been referred to by systematists in this country as *T. perditor* Fabr., which species I believe does not occur within the limits of the United States, either in the southeast or southwest." By 1914 he had changed his opinion and recorded *T. perditor* from southern Florida.

73 (161). *THYANTA CASTA* Stal, 1862, 104.

Elongate-oval, subdepressed. Above greenish-yellow to pale green, sometimes suffused with reddish, but rarely with a reddish band between the humeral angles; joints 2—5 of antennæ, narrow side margins of pro-

notum and tarsi often reddish; under surface yellow or greenish-yellow, the spiracles often black and the incisures at end of ventral segments always with black points. Head much as in *custator*, the tylus slightly exceeding the cheeks; second joint of antennæ slightly longer than third. Pronotum with front side margins straight, humeral angles less obtuse. Elytra and apical half of scutellum finely and evenly punctate, without the transverse rugæ shown elsewhere above. Genital plate of male with the ends of lobes each side of emargination less flattened than in *custator*. Other characters as given in key. Length, 8—9 mm.; width, 5—5.5 mm.

Dunedin, Sarasota and Ft. Myers, Fla., Nov. 2—April 12. Beaten from vegetation along the margins of wet hammocks. A neotropical species described from Mexico and known in the United States only from southern Florida, Texas, New Mexico, Arizona and California. The smaller size, more rugose pronotum and scutellum, paler color and more depressed form are the chief differential characters between this species and *custator*.

74 (160). *THYANTA CALCEATA* (Say), 1831, 8; I, 320.

Broadly oval, subdepressed. Above green or dull greenish-yellow; pronotum with margins of sides and two small dots near middle of apical half black, and a rather wide purplish-red band between the humeral angles; membrane hyaline, often with small rounded fuscous spots on basal portion; antennæ with last two joints fuscous, reddish at base; under surface greenish-yellow, the spiracles and a small point on the ends of ventral incisures brownish; legs greenish, the tarsi in part reddish or fuscous. Head flat, as wide across the eyes as long, apex broadly rounded, cheeks reaching tip of tylus. Pronotum with blackish margins rugose above, humeral angles obtuse; disk rather coarsely and unevenly punctate with a few broken transverse whitish rugæ on basal portion. Scutellum as described in key, its broader basal portion with transverse rugæ enclosing the punctures. Elytra finely and evenly punctate without trace of rugæ. Connexivum narrowly exposed, pale with a black point on each incisure. Genital plate of male narrower and more convex than in *custator*, its lobes each side of the broad posterior emargination less divergent and less flattened than there, the small median lobe rounded or subangulate. Length, 9—10 mm.; width, 5.5—6 mm.

Crawford Co., Ind., Aug. 31; Marco, Fla., March 9 (*W. S. B.*). Fairfax County and Great Falls, Va., Aug. 31—Sept. 31 (*Davis*). Ranges from New England west and southwest to Illinois and Florida. This species was erroneously made a synonym of *custator* by Stal (1872, 34). He was followed by all American authors,²⁷ until Barber (1911, 108) set forth the con-

²⁷Uhler (1872, 399) regarded it as a variety of *custator* and stated that it was "common in Maryland," but in all his later papers he placed it as a synonym of that species.

stant differences between the two, and resurrected Say's name from synonymy.²⁵ He stated that *calceata* "seems to be confined to the territory east of the Appalachians and appears to be more characteristic of the highlands and mountain districts." Hart (1919, 184) has since recorded that "the species had already been recognized by Dr. S. A. Forbes as distinct in our collection" from examples taken at Urbana, Towanda and Tamaroa, Ill., May 2—Sept. 22, and that specimens from Kentucky and Florida are in the Bolter collection.

75 (—). *THYANTA ACCERRA* McAtee, 1919, 16.

Broadly oval, subdepressed. Greenish-yellow to brownish-green, more or less sprinkled with dark brown or fuscous punctures, these forming faint dark markings on basal half of pronotum and corium and on the scutellum more aggregated to form a dark border each side of a vague pale median stripe reaching from near base to apex; pronotum with front side margins edged very narrowly with black and with two blackish dots on middle of apical portion; corium with numerous widely scattered smooth, slightly elevated white spots; membrane with many distinct oblong black dashes along the veins; connexivum reddish-yellow with an oblong blackish spot on each incisure; under surface and legs yellow or greenish-yellow, sprinkled with numerous small brownish dots; spot near spiracles and a point on the end of each ventral incisure black. Form and structural characters much as in *calceata*. Joints 2, 4 and 5 of antennæ subequal in length, each slightly longer than third. Front side margins more obviously concave than there. Length, 9—11 mm.; width, 5—6 mm.

Dunedin, Fla., Nov. 2—March 20. Taken frequently by sweeping low shrubs, huckleberry, etc., in open pine woods and along the bay front. Described by McAtee as a variety of *custator*, from specimens taken in October at Barachias, Ala., and San Antonio, Tex. Regarded by Barber (Ms.) as a form of *casta* but in my opinion a valid species, or, if a variety of anything, one of *calceata*. The white spots on corium, black dashes on membrane, dull yellow stripe vaguely bordered with fuscous on scutellum and spotted connexivum are its most prominent differential characters.

76 (162). *THYANTA ANTIGUENSIS* (Westwood), 1837, 36.

Broadly oval, subdepressed, small for the genus. Above dark green, fading to greenish-yellow, thickly marked with small brownish punctures; antennæ greenish, the outer joints tinged with reddish; pronotum with

²⁵He was led to do this by the researches of Prof. E. B. Wilson, who had shown that while *T. custator* has but 16 chromosomes in the germ cells of both sexes, *calceata* has 27 in the male and 28 in the female.

band as described in key; scutellum tipped with dull reddish; membrane hyaline, without spots; connexivum and ends of ventral plates with a small black point on the incisures; under surface yellow or greenish-yellow, the tip of beak fuscous. Head narrowed toward apex which is broadly rounded; cheeks as long as tylus. Basal half of scutellum with a few narrow, pale transverse rugæ, the punctures intervening; connexivum narrowly exposed. Genital plate of male with hind margin subtruncate or very broadly emarginate. Other characters as in key. Length, 5.5—7 mm.; width, 4 mm.

Mission, Tex., Dec. 5 (*Ill. Nat. Hist. Surv. Coll.*). A neotropical species which, according to Barber (1914, 523), has been taken by Mrs. Slosson in southern Florida. Recorded also by Van Duzee (1917, 53) from Florida, Arizona, Texas and California. The *Pentatoma tæniola* Dallas (1851, 250), described from Central America, is a synonym. The pronotal band between the humeral angles is testaceous, scalloped and margined behind with brown or crimson. It was found by Van Duzee (1907, 9) in Jamaica "On a low whitish succulent weed, allied to *Chenopodium*, growing along the roadside."

77 (163). THYANTA RUGULOSA (Say), 1831, 7; I, 319.

Broadly oval, subconvex, small for the genus. Above pale green fading to dull greenish-yellow, marked, especially on scutellum, with small brownish punctures, tip of scutellum yellow; tergum black at base, the last three segments and the connexivum green or greenish-yellow; under surface green or greenish-yellow, thickly marked with small green punctures. Head broadly sinuate in front of eyes, the apex bluntly rounded; cheeks slightly surpassing tip of tylus; antennæ short, second joint longest, fourth and fifth subequal, third one-half the length of second. Pronotum with front portion strongly declivent, side margins broadly but evidently concave, hind angles obtusely rounded; disk with several narrow, transverse rugæ, the most distinct of which is on the front portion and ends in the callosities each side. Connexivum rather broadly exposed; osteole with tube nearly as long as canal, the supporting plate very rugose. Length, 6—7 mm.; width, 4—4.5 mm.

Cape Sable, Fla., Feb. 23 (*W. S. B.*); beaten from foliage of the saffron plum, *Bumelia angustifolia* Nutt. This is a western and southwestern species, ranging from Nebraska to Utah, California, Texas and Arizona, and has not before been recorded from east of the Mississippi, though Uhler (1872, 399; 1876, 290) mentions it as occurring in Cuba. Of its local habitat in the west Uhler (1877, 403) states that in Clear Creek Canyon, Colo., it was moderately common "on wild gooseberry and several kinds of bushes which grew near the running

streams;" while Van Duzee (1904, 54) says that on the dry arid prairies of Colorado and Utah he found it "exceedingly common on a low species of *Atriplex* having a whitish-green foliage. On these bushes the insect assumes a green gray color assimilating to the color of its surroundings."

78 (—). *THYANTA PSEUDOCASTA* sp. nov.

Oval, narrowed behind, subdepressed. Above dull greenish-yellow, more or less tinged with reddish; antennæ greenish or greenish-yellow, the apical third or more of joints 3 and 4 reddish; membrane whitish-hyaline, flecked on basal half with numerous faint fuscous marks; connexivum pale, the extreme apical angle of each segment blackish; under surface and legs a nearly uniform greenish-yellow; tarsi, and sometimes numerous minute scattered blotches on abdomen, fuscous. Head oval, flat, as wide across the eyes as long; cheeks equalling tylus; joints 3—5 of antennæ subequal, each one-fourth longer than 2. Pronotum with front portion strongly declivent; sides feebly but distinctly concave, humeral angles obtuse; disk with fine transverse rugæ, surrounding irregular groups of three or four punctures. Scutellum with similar rugæ on basal two-thirds; its sides strongly converging, tip narrowly rounded, but slightly surpassing the lower inner angle of corium. Connexivum very narrowly or not at all exposed. Elytra evenly not densely punctate without rugæ or smooth areas. Abdomen with sides finely alutaceous, minutely and sparsely punctate, the median area smooth. Genital plate of male widely, evenly and shallowly concave, its apical margin broadly deflexed, without visible lateral or median lobes. Length, 7—8 mm.; width, 4—5 mm.

Miami, Cape Sable, Caxambus and Key West, Fla., Feb. 23—April 5. A subaritime and probably a neotropical species taken in some numbers at each station by beating vines and other foliage along the margins of dense hammocks. Allied to *casta* but much smaller and darker, more tapering behind, without trace of black spots on thorax or ventrals and with a much more widely emarginate genital plate of male. It is our only species having the third joint of antennæ distinctly longer than second.

SUBTRIBE II OF PENTATOMINI.

Species varying much in form, size and hue, but agreeing in having the osteolar opening rounded, and usually with either a small curved anterior auricle, or a canal, which is very short and ends abruptly, not drawn out and gradually evanescent as in Subtribe I; second ventral, as there, without a forward projecting tubercle or spine. The cheeks are rarely (*Necottiglossa*

and *Lora*) longer than the tylus and more rarely (*Proxys*) distinctly shorter. The humeral angles often end in a strong spine and the side margins of pronotum in two genera (*Euschistus* and *Lora*) are distinctly crenulate. The subtribe comprises some of our most common Pentatomids (*Mormidea*, *Euschistus* and *Cosmopepla*), three genera to which the name "stink-bug" pre-eminently belongs. Eleven of the 25 eastern genera comprising the tribe Pentatomini belong in this group, and another is included in the key, as its single species probably occurs in western Illinois.

KEY TO EASTERN GENERA OF SUBTRIBE II OF PENTATOMINI.

- a. Cheeks with side margins not thickened and reflexed; head (except in *Neottiglossa*) not strongly deflexed; color (except in *Cosmopepla*) not black or blue, variegated with red or yellow.
- b. Smaller, length not over 15 mm.; cheeks with tips obtuse, rarely longer than tylus and then converging and contiguous in front of it; side margins of pronotum (except in *Euschistus*) not crenulate.
- c. Humeral angles of pronotum without an obtuse projecting process with emargination behind.
- d. Scutellum shorter than corium, its apical third narrower than apex of corium with tip not broadly rounded.
- e. Hind tibiæ not sulcate or grooved above throughout their length.
- f. First joint of beak distinctly longer than bucculæ; humeral angles of pronotum (in our species) not spined; scutellum either with white margins or a large white spot on each basal angle. VI. MORMIDEA, p. 122.
- ff. First joint of beak not longer than bucculæ; humeral angles of pronotum with long spines; scutellum without white margins or large white spots at base.
- g. Tylus rounded at apex, not surpassing cheeks; eyes and pronotum contiguous; humeral spines directed strongly forward. VII. SOLUBEA, p. 126.
- gg. Tylus acute at apex, strongly surpassing cheeks; eyes well advanced in front of pronotum; humeral spines directed outward. VIII. PROXYS, p. 127.
- ee. Hind tibiæ sulcate above throughout their length.
- h. Side margins of pronotum crenulate; humeral angles prominent, usually acute or acuminate. IX. EUSCHISTUS, p. 129.
- hh. Side margins of pronotum not crenulate; humeral angles obtusely rounded.
- i. Margins of front half of pronotum not strongly flattened; beak not passing hind coxæ; frena reaching middle of scutellum; length less than 10 mm. X. HYMENARCYS, p. 142.

- ii. Margins of front half of pronotum strongly flattened; beak reaching second ventral; frena surpassing middle of scutellum; length, 12 or more mm. XI. MENECLÆS, p. 145.
- dd. Scutellum equal to or longer than corium, its apical third wider than apex of corium with tip broadly rounded.
- j. Head porrect or nearly so; tylus strongly convex, distinctly elevated above surface of cheeks; length, 8 or more mm. XII. CÆNUS, p. 146.
- jj. Head either declivent or strongly deflexed; tylus scarcely elevated above level of cheeks; smaller, not over 6 mm.
- k. Cheeks longer than tylus and meeting in front of it; head almost as broad as base of scutellum; color not black with red or yellow markings. XIII. NEOTTIGLOSSA, p. 148.
- kk. Cheeks not longer than tylus; head much narrower than base of scutellum; color black with red or yellow markings. XIV. COSMOPEPLA, p. 151.
- cc. Humeral angles of pronotum with a distinct obtuse process with an emargination behind it. PRIONOSOMA.²⁹
- bb. Larger, length, 20 or more mm.; cheeks with tips subacute, surpassing tylus but not converging in front of it; side margins of pronotum crenulate. XV. LOXA, p. 153.
- aa. Cheeks with side margins thickened and reflexed; head strongly deflexed, the front almost vertical; color black or blue, variegated with red or yellow. XVI. MURGANTIA, p. 154.

VI. MORMIDEA Amyot & Serville, 1843, 134.

Small oval or elongate-oval subconvex species having the head broad, more or less declivent, cheeks slightly concave, usually very coarsely punctate, reaching tip of tylus; beak reaching hind coxæ, its second joint longer than third and fourth united; eyes globose, prominent; pronotum with front portion strongly declivent, its side margins unarmed, humeral angles either obtusely rounded or spinose, disk evenly punctate and in our species bearing one or two callosities; scutellum shorter than corium, its apex narrowly rounded, frena extending beyond its middle; connexivum narrowly or not at all exposed; membrane with veins simple and parallel; tibiæ not grooved; osteolar opening with a short auricle, but without a

²⁹This genus is included as its single species, *P. podopioioides* Uhler (1863, 364), has been taken in Missouri and at Fort Madison, Iowa, on the Mississippi River just across from Illinois. It is 8.5—11 mm. in length, brownish-yellow in hue, with the humeral angles emarginate, scutellum with a broad Y-shaped ridge and margins of abdomen strongly serrate. Its general range is western, extending from the Mississippi River to the Pacific. The genera *Paduvus* and *Elia*, extralimital members of this subtribe, have been erroneously recorded as being represented in our territory; the former by Van Duzee (1904, 78) and Hart (1919, 180) as occurring in Florida, but the specimen of *P. viduus* (Voll.), on which the records were based, was taken in Arizona, not Florida, as shown by Barber (1910, 35) and Van Duzee (1917, 441). The specimen of *Elia americana* Dall, mentioned by Van Duzee (1904, 49) as having been taken by Provancher in Quebec, has since been shown by Van Duzee (1912, 318) to be a dark example of *Neottiglossa undata* Say.

canal, and surrounded by an elevated rugose opaque area at the base of the supporting plate.

About 40 species are known from North and Tropical America, only six of which are recorded from the United States. Of these three occur in our territory.

KEY TO EASTERN SPECIES OF MORMIDEA.

- a. Humeral angles of pronotum obtusely rounded; under surface in great part or wholly piceous.
- b. Pronotum with all its margins narrowly edged with white, its front portion with a median, often interrupted, transverse white calloused line, its front angles without a tooth. 79. LUGENS.
- bb. Pronotum with only the front side margins edged with white, its front portion with two small rounded calloused spots, and front angles with a small outward projecting nodule or blunt tooth. 80. PICTIVENTRIS.
- aa. Humeral angles of pronotum subtruncate, feebly notched; under surface in great part dull yellow; basal angles of scutellum each usually with a large ivory-white calloused spot. 81. GUERINI.

79 (111). MORMIDEA LUGENS (Fabricius), 1775, 716.

Oval, subdepressed above, more convex beneath. Above dull grayish-yellow; head, apical third of pronotum and entire scutellum black, faintly bronzed; antennæ with joints 1—3 mostly pale, 4 and 5 fuscous except at base; scutellum surrounded except at base with a calloused white line, this edged without from base to beyond middle by a row of coarse black punctures; membrane dull brown; tergum and connexivum black, the latter narrowly edged with white; under surface piceous-black, shining, faintly bronzed; legs yellow, flecked with brownish dots; margins of abdomen with a calloused white line. Head moderately declivent, coarsely, deeply, densely punctate; second joint of antennæ scarcely half the length of third. Pronotum more sparsely punctate than head, front portion with an oblong smooth space before each end of the transverse white line, hind portion with numerous fine transverse wrinkles separating the rows of punctures. Scutellum coarsely and deeply punctate at base, the punctures finer and more sparse towards apex. Thoracic pleura coarsely and densely punctate, the abdomen more sparsely and finely so. Genital plate of male deeply and rather acutely notched, its hind margin deflexed. Length, 6—7 mm.; width, 3—4 mm. (Fig. 25).



Fig. 25, X 5. (Original).

Common throughout both Indiana and Florida. Hibernates beneath logs and other cover as imago and therefore to be

found every month in the year. From the time that the survivors emerge from their winter hiding places in April until the hoar frosts of autumn impel their offspring to seek cover, it may be taken by sweeping herbage along roadsides and borders of cultivated fields, especially those in dry sandy places. On Oct. 16, in Vigo County, I once found hundreds of them crawling over the foliage of the strawberry bush, *Euonymus americanus* L. In Florida it has often been noted at porch light and in winter is sometimes beaten from bunches of Spanish moss or dead leaves. Of the 17 specimens at hand 13 have the transverse calloused white line of thorax entire, while in the other four it is broken into two oblong dashes. In four there is also a small white spot at middle of base of scutellum.

This small olive-gray "stink-bug" is one of the most common Pentatomids of the eastern United States, occurring usually in numbers everywhere from Quebec and New England to Wyoming and Texas; also in Mexico and the West Indies, but is not known from the Pacific slope. The food plant is said by numerous authors to be the common mullein, but I have never found the young on that homely herb and believe that the bug is only a visitor thereon, especially in the autumn months when it is seeking a hiding place. In this I am borne out by Stoner (1920, 76) who has written of its habits in Iowa as follows:

"Usually we have found this insect on Kentucky blue grass (*Poa pratensis* Linn.) growing along the edges of woods or in cleared places in the woods. Specimens have also been taken on common mullein (*Verbascum thapsus* Linn.) growing in pastures and open fields. The insects have a tendency to visit this plant, especially towards autumn, as the cold days come on, the dense wool which covers the leaves offering considerable warmth. Under these mullein stalks after a heavy freeze or in the spring one can usually find the remains of bugs which have sought shelter but have been unable to survive the rigors of an Iowa winter. Individuals which have successfully hibernated have been found under dead leaves along roadsides."

80 (112). MORMIDEA PICTIVENTRIS Stal, 1862, 103.

Elongate-oval, subconvex. Above grayish-yellow to brownish-black, shining; pronotum with narrow edge of side margins and two round elevated spots on front portion white tinged with reddish; scutellum with the tip, a small spot at middle of base, a curved submarginal line extending back from each basal angle to beyond middle and also the basal fourth of costal edge of elytra, reddish-white; under surface dull yellow with a broad median stripe and a narrower one each side extending back to fifth ventral, shining black or piceous; legs yellow with purplish

dots. Head as in *lugens* but less declivent, the margins of cheeks less reflexed. Pronotum as there, the front angles with a small yellow outward projecting tooth; disk coarsely, deeply, closely punctate, the punctures on declivity separated by narrow oblique and transverse ridges. Scutellum coarsely and deeply punctate, elytra more sparsely and shallowly so. Abdomen with sides sparsely and rather finely punctate, the middle third smooth; ends of ventral segments with hind angles projected slightly backward so that from above the edge of abdomen appears subserrate. Length, 7—8.5 mm.; width, 4 mm.

Dunedin and Lakeland, Fla., Nov. 16—March 2. (*W. S. B.*). Three taken at Dunedin from beneath a pile of dead leaves of cabbage palmetto; one dead and damaged specimen at Lakeland from a spider's web on oak tree. Originally described from Mexico, Cuba and Nova Granada. Not mentioned in Barber's "Hemiptera of Florida," but recorded from that State and Texas by Van Duzee (1917, 38).

81 (116). *MORMIDEA GUERINI* Lethierry & Severin, 1893, 123.

Elongate-oval, subdepressed above, convex beneath. Above dull reddish-brown to piceous, thickly marked with small fuscous punctures, these aggregated to form a dark spot on humeral angles of pronotum and another on base of scutellum; narrow edge of side margins of pronotum, tip and a large irregular curved spot on each basal angle of scutellum, a small spot near outer apical angle of corium and the edge of connexivum calloused ivory-white; under surface dull yellow, the middle and sides of abdomen with a row of irregular fuscous blotches; legs dull yellow flecked with purplish dots. Head flat, porrect; cheeks finely and rather sparsely punctate, a little shorter than tylus, their sides distinctly sinuate. Pronotum with front half moderately declivent, front angles with a small tooth, disk finely, rather sparsely and evenly punctate, its side margins distinctly, not strongly concave. Scutellum finely and sparsely punctate, the tip and basal spots smooth. Elytra finely and evenly punctate. Abdomen with sides finely and shallowly punctate, the middle almost smooth. Apex of genital plate of male with a prominent rounded median lobe. Length, 8—9.5 mm.; width, 5—5.5 mm.

Everglade, Fla., May (*Davis*). Originally described by Guerin from Cuba as *M. geographica*, which name was preoccupied. First recorded from this country by Barber (1914, 522), his record being based on Everglade specimens taken by Davis in June. He states that Cuban specimens show considerable variation in the extent of the yellow markings on corium and scutellum, these parts in some cases being unmarked with yellow.

VII. *SOLUBEA* Bergroth, 1891, 235.

Elongate-oblong subconvex species having the head porrect,

longer than wide; cheeks slightly shorter than tylus; beak reaching hind coxæ, the second joint the longest; antennæ stout, joints 1—2 subequal in length, much shorter than 3—5 which are subequal; pronotum with side margins strongly concave, the humeral angles with a prominent forward-projecting spine; scutellum strongly tapering, its tip narrowly rounded; membrane surpassing the abdomen, its veins simple; outer hind angles of ventral segments acute, prominent; tibiæ not grooved. The genus was formerly known as *Ocbalus* Stal, which name was preoccupied. He recognized (1872, 22) four species, two from Brazil, one from Cuba and the following:

82 (117). *SOLUBEA PUGNAX* (Fabricius), 1775, 704.

Dull greenish- or brownish-yellow marked with fuscous punctures, these so arranged as to form a vague stripe along middle of each cheek and often two vague blotches on elevated basal portion of pronotum; antennæ reddish-yellow; outer apical angle of corium with a small black

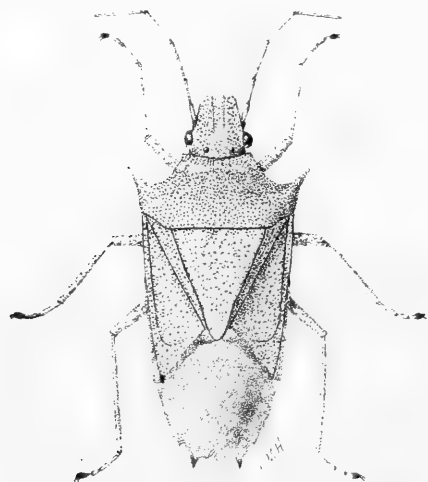


Fig. 26. X 5. (After Hart & Malloch).

point; under surface dull yellow, a spot at base of middle of each ventral and the spiracles and coarse punctures of sides of abdomen fuscous; metasternal plate with two small black spots on its elevated rugose basal half; legs yellow dotted with fuscous. Head sparsely punctate, its base almost smooth. Pronotum with edges of side margins roughened; disk with front portion sparsely and irregularly punctate, hind one more closely and regularly so with a few transverse rugæ intervening. Scutellum and elytra sparsely and rather finely punctate. Other structural characters as under generic heading.

Length, 10—12 mm.; width, 4.5—5.5 mm. (Fig. 26).

Frequent in southern Indiana, much less so in the central portion; not as yet taken from the counties north of Indianapolis; April 18—Sept. 28. Swept from roadside herbage in late spring and summer and taken from beneath cover in April. It probably hibernates as an imago, one live and two dead specimens having been found in close proximity beneath a log near New Harmony, Posey County, on April 26. Dunedin, Lake-

land and R. P. Park, Fla., Nov. 21—April 26; frequent about Dunedin where it occurs on weeds in old fields and on shrubs along the margins of wet hammocks. Its known range extends from Connecticut and southern New York westward on a line south of central Indiana and Illinois to Colorado and south and west throughout Florida to Texas, Arizona, Mexico and the West Indies. Garman (1891, 61) says of its habits:

"This is one of the commonest of the Pentatomidae in Kentucky, occurring everywhere in July and August on grasses. . . . In the summer of 1890 it was so common on several species of *Setaria* and *Panicum* that as many as 20 adults could be taken from a single stool of grass. A brief examination was sufficient to show that the bugs were attracted by the grasses themselves, which they were puncturing and from which they were extracting the sap. They seemed especially fond of the young spikelets and where the bugs were abundant, large numbers of the spikelets were found to be dried up, having been emptied of their contents.

"The eggs were placed in scattered clusters, of about a dozen eggs each, on the stems of grass. Each cluster consisted of two series, the eggs being in contact, but those of one series alternating in position with those of the other. This arrangement of the eggs accommodates them to the stems of grasses. The eggs are pale green and measure .7 mm. in length by .6 mm. across, the diameter being maintained to the extremities. The attached end is perceptibly convex. The free end is so little convex as to appear flat; it is rimmed and provided with a marginal series of capitate appendages, which are so small as not to be easily made out even with a good lens."³⁰

Uhler (1876, 285) says that *S. pugnax* "occurs at considerable altitudes on the Black Mountains of North Carolina and is not unfrequent upon grassy and shrubby spots in Georgia and Florida. In Maryland it may be found on low spots in the meadows, where the plants and grasses grow rich and dense, in June, August, September and October. It appears to lay eggs in late spring and toward the latter part of summer."

The *Pentatoma augur* of Say (I, 313) is a synonym of *S. pugnax*.

VIII. PROXYs Spinola, 1840, 325.

Elongate-oval, subdepressed species of medium size having the head porrect, long and narrow; tylus pointed and distinctly surpassing the cheeks; antennæ with basal joint stout, not

³⁰This description of the eggs shows that they are very similar to those of *Brochymena quadripustulata* (Fabr.), as described on p. 99 and it is probable that the eggs of all the Pentatomids are much alike in form and manner of deposition. (W. S. B.).

reaching end of cheeks, 2—5, slender, subequal; pronotum with front portion much narrowed and strongly declivent, its side margins rounded, humeral angles ending in a stout subtriangular spine, the apex of which is bent a little downward; scutellum shorter than corium, its apex narrowly rounded; membrane with veins simple, parallel; connexivum narrowly exposed; osteole with a short oblique auricle, the basal half or more of its supporting plate elevated and very coarsely rugose; ends of ventral segments with their hind angles acute and projecting backward; tibiae not grooved.

Stal (1872, 29) recognized four species, one from Brazil, two from Nova Granada and the following:



Fig. 27. X 3 $\frac{1}{2}$. (Original).

83 (138). *PROXYS PUNCTULATUS* (Palisot de Beauvois), 1805, 188.

Black, opaque; antennæ black or fuscous with base of joints 2—5 yellow; scutellum with tip yellow; legs mostly yellow, the apical fourth or more of femora black, the tibiæ with numerous black spots; tarsi fuscous. Beak reaching middle of second ventral, joints 3 and 4 subequal, second a little longer. Head, pronotum, scutellum and thoracic pleura coarsely, closely more or less confluent punctate. Elytra and abdomen finely rather sparsely punctate. Length, 11—13 mm.; width, 6.5—7 mm. (Fig. 27).

Posey County, Ind., April 9—Nov. 9. Taken from beneath logs on sandy hillsides where they were probably hibernating. Dunedin, Sanford and Ft. Myers, Fla., Feb. 9—April 9. Twenty or more were found on March 6 beneath a rotten chunk near the margin of an old orange grove at Dunedin. Barber records it from five other localities in Florida and it probably occurs throughout that State. Ranges from southern Indiana, southern Illinois and North Carolina west to Oklahoma and southwest to Texas, Mexico and Central America. Hart (1919, 189) mentions it as occurring at electric light at Cairo, Ill. Uhler (1876, 287) records a specimen from near Philadelphia, Pa., but it was probably an adventive.

The *Pentatoma tenebrosa* Say (I, 304) is a synonym of *punctulatus*. The *Proxys albopunctulatus* (P. B.), described from

Brazil, is listed by Uhler (1886, 6) as occurring in the "Southern States," but no definite locality record is known.

IX. *EUSCHISTUS* Dallas, 1851, 201.

Broadly oval species of medium size having the body sub-depressed above, convex beneath; head porrect, longer than wide; cheeks sinuate near base, usually equalling, rarely exceeding the tip of tylus; antennæ slender, half the length of body, first joint shortest and stoutest, third usually the longest, fourth and fifth subequal; beak reaching or slightly surpassing middle of hind coxæ, second joint almost as long as third and fourth united; pronotum with front portion strongly declivent, its side margins usually more or less concave, carinate and crenulate, humeral angles variable as to species; scutellum shorter than corium, frena reaching nearly to its tip which is narrowly rounded; membrane with simple longitudinal veins; connexivum usually narrowly exposed; ventral segments with outer posterior angles slightly prolonged; osteole with a very short bluntly rounded canal; tarsi grooved above throughout their length.

The members of this genus are the "stink-bugs" par excellence, some of the species being familiar to everyone who lives in or visits the country. Several of them often occur on shrubs or vines in the heart of the larger cities. More than 60 species have been described, 18 of which are known from North America, ten of these occurring in the eastern states.

KEY TO EASTERN SPECIES OF *EUSCHISTUS*.

- a. Spines of humeral angles, when present, not projecting upwards and forwards; ventral surface not strongly convex; membrane of elytra without convex oblong dark spots between its veins.
- b. Pronotum without an irregular smooth yellowish line between the humeral angles.
- c. Ends of ventral segments with a black point or dot on each front angle.
- d. Middle of abdomen without black spots.
- e. Side margins of pronotum distinctly sinuate or concave, the pale edge not bordered within by a line of blackish punctures; hind margin of genital segment of male entire,³¹ broadly curved or subtruncate; length 12 or more mm.
- f. Disks of pronotum, scutellum and elytra distinctly and more or less regularly punctate.

³¹The male of *subimpunctatus* is not known.

- g.* Cheeks equalling or but slightly surpassing tip of tylus; antennæ pale throughout; connexivum rather widely exposed. 84. *SERVUS*.
- gg.* Cheeks distinctly surpassing tylus; last two joints of antennæ usually blackish; connexivum not at all or very narrowly exposed. 85. *EUSCHISTOIDES*.
- ff.* Declivity of pronotum, basal half of scutellum and apical three-fourths of corium almost devoid of punctures; antennæ pale throughout. 86. *SUBIMPUNCTATUS*.
- ee.* Side margins of pronotum straight or nearly so, their edge white, bordered within by a line of black punctures; hind margin of male genital plate with a large median V-shaped notch and a much smaller one each side; length, 8—9.5 mm. 87. *POLITUS*.
- dd.* Middle of abdomen with one or more (usually a row of 3 or 4) black spots; length, 10—12 mm. 88. *TRISTIGMUS*.
- cc.* Ends of ventral segments without black spots at front angles;³² genital segment of male with a large black spot on basal half; antennæ with fifth joint and apical half of fourth black or reddish-fuscous. 89. *VARIOLARIUS*.
- bb.* Pronotum with a somewhat calloused smooth yellowish irregular transverse line between the humeral angles.
- h.* Larger, length, 10.5—12 mm.; upper surface without pale spots; hind margin of male genital plate broadly, shallowly concave or subtruncate.
- i.* Color reddish-brown; elytra without round dark spots; humeral angles acute or ending in a short spine; angles of side margins of ventrals without a small black spot. 90. *ICTERICUS*.
- ii.* Color fuscous-brown; elytra with numerous widely scattered small round dark spots; humeral angles obtuse, not spinose; front angles of side margins of each ventral with a small black spot. 91. *BIFIBULUS*.
- hh.* Smaller, length not over 9.5 mm.; scutellum and elytra with numerous small scattered pale spots; hind margin of male genital plate obtusely rounded, feebly sinuate. 92. *CRENATOR*.
- aa.* Spines of humeral angles directed upward and forward; ventral surface strongly convex; membrane with oblong convex black dashes between the veins. 93. *CRASSUS*.
- 84 (118). *EUSCHISTUS SERVUS* (Say), 1831, 4; I, 314.

Broadly oval, subdepressed above, more convex beneath. Above dull grayish-yellow, thickly marked with medium sized fuscous punctures, these in places aggregated to form indefinite dark markings; narrow edge of side margins of pronotum, basal third of costal margin of elytra and extreme tip of scutellum pale yellow; antennæ pale yellow, joints 4 and 5

³²I have followed Stål (1872, 26) and Van Duzee (1904, 44) in making the *absence* of these spots the principal character separating *variolarius* from its allies, as it is difficult to find another which will apply to both sexes. However, Hart (1907, 264; 1919, 191) and McAtee (1919, 16) have called attention to the fact that examples of this species occasionally occur in which these spots are present.

a little darker; each segment of connexivum with a black bar across its ends, the middle yellow; membrane fuscous, its tip paler; under surface pale yellow, the punctures of thoracic pleura and abdomen often tinged with reddish; legs yellow, the femora rather thickly, the tibiæ more sparsely, flecked with black dots; front angles of ends of third to sixth ventrals with a very small black dot. Cheeks slightly but evidently surpassing tip of tylus; second joint of antennæ very little shorter than third. Pronotum with side margins in front of sinus finely, unevenly crenulate; humeral angles subacute or narrowly rounded, disk of apical half unevenly and sparsely punctate, of basal portion more evenly and closely so. Scutellum irregularly punctate, more finely so toward apex. Elytra finely, unevenly and deeply punctate. Connexivum usually broadly exposed. Other characters as given under generic heading and in key. Length, 12.5–15 mm.; width, 7–9 mm.

Putnam, Crawford, Posey and Dubois counties, Ind., scarce, April 4–May 8, probably hibernated individuals. Ormond, Sanford, Bassenger, Dunedin, R. P. Park and Sarasota, Fla., common Nov. 19–April 3 (*W. S. B.*). Recorded by Barber from numerous other stations in Florida and said by Van Duzee to be “common everywhere” in that State. About Dunedin it occurs in winter beneath loose bark and in late autumn and early spring on the flowers of various plants, especially golden-rod and thistle.

The recorded range of *servus* is southern, extending from Massachusetts westward through southern Indiana and Illinois to Iowa and Kansas, and south and southwest to North Carolina, Florida, Louisiana, Texas and New Mexico. It has been mentioned by Uhler, but probably erroneously, from California, Dakota and Colorado. Zimmer does not include it from Nebraska and Stoner records the taking of only a single specimen in Iowa. Hart (1919, 193) states that “in Illinois the species appears to be much more numerous in the southern portion, ranging from Urbana southward.” Say’s types were from Pennsylvania and Florida. Morrill (1910, 76) says that:

“In the vicinity of Dallas, Tex., hibernated individuals of both sexes of *servus* are fairly common about or soon after April 1. Early in the season the insects do not show any decided preference for any particular food plant, but after the appearance of the bolls upon the cotton plants comparatively few specimens are found outside the cotton fields. Doubtless weeds growing in profusion along the roadsides and fences furnish favorable breeding places in early summer for the bugs which later turn their attention to the cotton on which, in limited areas comprising only a few acres each, they have occurred in numbers sufficient to cause the destruction of the majority of the bolls. One female

kept in confinement deposited 162 eggs, and the average number per batch by other individuals was 16.4."

85 (121). *EUSCHISTUS EUSCHISTOIDES* (Vollenhoven), 1868, 180.

General form that of *servus*, the abdomen apparently a little narrower, due to the less exposed connexivum. Color much as in *servus*, the fuscous punctures more dense along the side margins of the pronotum; antennæ with last two joints more distinctly fuscous; membrane with fuscous dots more numerous and distinct; under surface usually more strongly tinged with pinkish. Front of head cleft, due to the longer, more pointed cheeks which surpass the tylus by a distance equal to or greater than the mean width of the latter. Pronotum with humeral angles usually more broadly rounded. Length, 12—14 mm.; width, 7—8.5 mm.

Frequent throughout Indiana, April 21—Nov. 28; apparently more so in the northern counties. Occurs in summer and early autumn on foliage and flowers of various kinds, especially those of dogwood, wild hydrangea, goldenrod, thistle, etc.; in late autumn and early spring, beneath dead leaves and under bark. This is the species described by Uhler (1871, 96) as *Euschistus fissilis*, and it is referred to by most authors under that name. Kirkaldy (1909, 64) placed Uhler's name as a synonym of the *Dicræus euschistoides* of Vollenhoven. In this he has been followed by Van Duzee (1917) and subsequent authors. It ranges from Quebec and New England westward across southern Canada and the northern United States to Vancouver's Island, Montana and Colorado, but not yet known from the Pacific Coast States unless Uhler's (1876, 286) California record of *servus* rightfully applies to it. The most southern localities recorded are Wilkesboro, N. Car. (*Engelhardt*, 1910, 148) and New Jersey, "throughout the State, May—October, the most common species" (*Smith*, 1910, 15). South of the Ohio River and westward at about the same parallel it is apparently replaced by *servus*.

It is very easy to separate specimens of *euschistoides* taken in northern Indiana from typical examples of *servus* from the southern states, but numerous individuals occur in southern Indiana which appear to intergrade, the cheeks being distinctly longer than tylus, yet shorter than in those from the northern counties, the connexivum narrowly exposed, not wholly covered as in those from the north nor broadly exposed as in typical *servus* and antennæ often wholly pale. It is my opinion that a

large series from all parts of the United States will show that the two forms are but geographic races of the same species, bearing the same relation to each other as do *pyrrhocerus* and *tristigmus*. The black points on the incisures of the ventral segments are present in all my specimens of *euschistoides*, though smaller than in *servus*. Stoner (1920, 81) says they are absent in *euschistoides*, though in his key he places the species under the division having them present.

86 (—). *EUSCHISTUS SUBIMPUNCTATUS* Malloch, 1919, 191.

Form of *servus* but a little smaller. Above dull greenish-yellow, the margins and middle of disk of basal half of pronotum, the margins of middle third of scutellum and the embolium of the elytra thickly marked with rather coarse fuscous punctures; remainder of upper surface wholly smooth or with a few widely scattered punctures; color otherwise above and beneath almost as in *servus*, the black points on incisures between the ends of ventral segments a little larger. Tylus just reaching tips of cheeks. Humeral lateral angles produced in the form of a very short acute spine. Structural characters otherwise as in *servus*. Length, 11.5 mm.; width, 7 mm.

Anna, Ill., July 22, 1883. Unique female type in the Urbana collection. Whether this is an "individual freak" of *servus* or a valid species will not be known unless additional specimens are taken. It certainly differs widely in sculpture of upper surface from any of our other known species.

87 (124). *EUSCHISTUS POLITUS* Uhler, 1897, 117.

Oval, depressed, small for the genus. Above dull grayish- or reddish-yellow, thickly marked with small fuscous punctures; narrow edge of side margins of pronotum and basal third of costal border of elytra ivory white, the former bordered within, more definitely on apical half, by a line of black punctures; narrow edge of cheeks and their under surface blackish; antennæ yellow, the last two joints with apical halves darker; connexivum alternated with fuscous and yellow; membrane dark brown, the tip paler; under surface and legs yellow, the latter with black dots; incisures at sides of abdomen with a minute black point. Head nearly as wide across the eyes as long, apex broadly rounded; tylus flat, equalling cheeks. Pronotum finely and nearly evenly punctate, side margins almost straight, their apical halves finely crenate; humeral angles obtusely rounded. Scutellum somewhat rugose with small vague whitish slightly elevated areas. Elytra finely and evenly punctate. Male genital segment as described in key. Length, 8.2—9.5 mm.; width, 5.5—6.2 mm.

Starke and Crawford counties, Ind., June 17—Aug. 31 (W. S. B.) ; in the former county beaten from hazel along the edges

of a swale; in the latter, swept from goldenrod. Pine, Lake Co., and Mineral Springs, Porter Co., Ind., May 21—Sept. 4 (*Gerhard*); on lake beach and in a tamarack swamp. A member of the Alleghanian fauna and, except on the high wooded slopes of Crawford County, occurring in Indiana only in the northern portion and there apparently very scarce. Its known range extends from New England to Michigan and northern Illinois, south to Maryland. Specimens from North Muskegon, Mich., and Willow Springs, Ill., are in the *Gerhard* collection. Hart (1919, 192) records it from Dubois and Muncie, Ill. Olsen (1912, 52) states that on Long Island, N. Y., it is "locally common throughout the pine region and on Rockaway Beach in the washup. I have found it common in the pine woods by beating the scrub oak." It is our smallest and most depressed member of the genus and is easily distinguished by the characters given in key.

88 (125). *EUSCHISTUS TRISTIGMUS* (Say), 1831, 4; I, 314.

Elongate-oval, subdepressed, size small for the genus. Above dull gray, thickly and rather evenly marked with small fuscous punctures; narrow edge of side margins of pronotum and extreme tip of scutellum yellow; membrane fuscous-brown, usually with a number of vague small darker spots, the tip often paler; under surface dull yellow sprinkled with reddish points; middle of abdomen with from one to four black spots, the one on sixth ventral the largest, oval or oblong and very rarely absent, the others on ventrals 3—5 varying in size and often in part or wholly wanting; incisures at ends of ventrals 3—6 with a black point; sides of abdomen often with two rows of vague fuscous spots; legs yellow flecked with brownish dots. Head very flat, slightly longer than wide, tylus equalling or very feebly surpassing the cheeks. Pronotum with side margins broadly concave, their edge very finely crenulate, male, more coarsely so, female; humeral angles obtuse; disk with punctures dense along the margins, more sparse elsewhere, with numerous smooth small whitish areas intervening. Scutellum with similar narrow and more elongate transverse areas. Elytra evenly and finely punctate, marked with a few scattered white smooth dots. Connexivum narrowly exposed, each segment fuscous with a rounded dull yellow median spot. Abdomen very finely rugosely punctate; thoracic pleura coarsely marked with reddish punctures. Genital plate of male with its hind margins broadly and shallowly concave, the concavity limited each side by a short obtuse tooth. Length, 10—11 mm.; width, 6.5—7.5 mm.

Frequent throughout Indiana, Feb. 14—Dec. 12. In this State it hibernates singly or in groups of two to four, beneath cover of various kinds, especially beneath logs, chunks or

rails whose sides are partly buried in dead leaves or vegetable mould. About April 1 the survivors begin to emerge and for a fortnight or more can often be taken on the wing. From then on until the hoar frosts of autumn it occurs on the flowers and foliage of weeds along roadsides and in open woodlands, frequenting especially those of thistle, mullein and goldenrod. As a species it ranges from Nova Scotia, Quebec and New England west to Colorado and Washington, and south to Florida, Louisiana, Oklahoma, Texas and Mexico. The race or variety *tristigmus*, as above described, occurs for the most part in the Upper Austral Life Zone, between the parallels 38 and 41 degrees of the territory mentioned. Barber records it from Sanford and Jacksonville, Fla., though his records doubtless refer to the form *pyrrhocerus*. Olsen (1912, 52) states that it has been bred from egg to imago on the fruit of elder and also on moth mullein. Other food plants mentioned are potato and cotton. Of its habits in Iowa, Stoner (1920, 83) writes:

“Ordinarily this bug is found in or along more or less wooded and shady places and moist situations grown up in rank weeds and bushes. At Lake Okoboji it is one of the commonest woodland forms and occurs most frequently on wild black raspberry on which plant numerous examples have also been taken in other parts of the State. Sometimes it occurs on wild red raspberry, and not infrequently are specimens found on the cultivated plants in our gardens. In late summer the species also occurs on hazelnut bushes. Adults are often found hibernating under leaves in the vicinity of clumps of such bushes.”

Three forms of *E. tristigmus* occur in Indiana and the eastern states, each belonging to a different life zone and fauna,³³ but merging gradually one into another and probably best designated as geographic races. In order that the student, if so inclined, may label his specimens with trinomials, they may be separated by the following key:

KEY TO RACES OR VARIETIES OF *EUSCHISTUS TRISTIGMUS* (SAY).

- a. Humeri broadly rounded; scutellum with apical fifth mostly pale marked with scattered fuscous punctures; fifth joint of antennæ and apical half of fourth distinctly fuscous. (Alleghanian fauna.)
88a. LURIDUS.
- aa. Humeri not broadly rounded; scutellum with extreme tip only pale; last two joints of antennæ wholly pale, or at most brownish.

³³See the author's "Coleoptera of Indiana," p. 4, for a map showing the life zones of the State; also his paper entitled "The Life Zones of Indiana as Illustrated by the Distribution of Orthoptera and Coleoptera within the State." (Proc. Ind. Acad. Sci. for 1908 (1909), pp. 185-191.

- b. Humeri broad, subtriangular, their tips obtusely angled; under surface yellow. (Carolinian fauna.) 88. TRISTIGMUS.
 bb. Humeri narrower, more inclined upward and backward, their tips acute angled or spinose; under surface dull white. (Austro-riparian fauna.) 88b. PYRRHOCERUS.

The typical race *tristigmus* (Say), is the one described above. In his original description Say mentions the antennæ as being "rufous, the fourth and fifth joints brown except the base of fourth; thorax with lateral angles rather prominent, angulated, but not spiniform." The other two races are briefly treated below.

88a (—). *EUSCHISTUS TRISTIGMUS LURIDUS* Dallas, 1851, 207.

Form, especially in males, broader and less tapering behind the humeri than in *tristigmus*. Color much as there, the antennæ differing as stated in key; apical fifth of scutellum distinctly more sparsely punctate, in great part smooth and white; membrane with fuscous spots more distinct; pale spot at middle of each connexival segment larger, usually reaching the margin, in *tristigmus* rounded and wholly enclosed by fuscous. Humeral projections broader, with concavity in front more pronounced, their tips not angulated but rounded. Length, 10—12 mm.; width, 7—7.5 mm.

Porter, Starke and Kosciusko counties, Ind., June 15—26. Beaten from scrub oak and other foliage. Sherborn, Mass., Oct. 25 (*Frost*). This is the form occurring in the Transitional Life Zone. The types of Dallas were from Trenton Falls, N. Y., and Nova Scotia. It was placed by Uhler (1861, 23) as a synonym of *tristigmus*. Malloch (1919, 192) states that he is "of the opinion that *luridus* is distinct from *tristigmus*. The regularly rounded humeri of *luridus* are very conspicuously different from the angular ones of *tristigmus*, and with the naked eye it is possible to recognize the forms very readily." He states that *luridus* occurs in northern Illinois and that specimens are in the Urbana collection from Buffalo, N. Y.; Omaha, Nebr.; Duluth, Minn., and Lone Rock, Wis. I cannot agree with Malloch that *luridus* is a distinct species, as large series show that it merges gradually into *tristigmus*. In my opinion it is best designated as a race or variety worthy of a trinomial name, whose range, roughly stated, extends from Nova Scotia westward, north of latitude 41 degrees. It is probably the form that Van Duzee (1894, 171) mentions as "abundant everywhere in trees, bushes and coarse weeds from May to September," about Buffalo, N. Y.

88b (125a). *EUSCHISTUS TRISTIGMUS* PYRRHOCERUS (Herrich-Schaeffer), 1842, 71.

Females similar in form to those of *tristigmus*, the males a little smaller, narrower and more elongate. Color much the same, the general hue a little more fuscous, the white calloused spots of pronotum and scutellum less transverse and more distinct, the antennæ with all the joints reddish-yellow; under surface and legs dull white instead of yellow. Ventrals 3 and 4 with black spots more often lacking, 5 and 6 with the spots smaller and more oblong. Differs mainly in the form of the humeral angles of pronotum, these being longer, narrower, more inclined upward and backward, with tips acute or distinctly spinose. Length, 9–10 mm.; width, 6–7 mm.

Marion, Knox, Crawford and Posey counties, Ind., April 20—Sept. 24; not taken north of the middle of the State. Dunedin, and Sanford, Fla., March 12—30, mating on the former date. This, the southern race or variety of *tristigmus*, has its main distribution over the eastern United States south of latitude 38 degrees, or from Virginia west and south to Oklahoma, Louisiana, Texas and Mexico, but occurs as far north as central Indiana, central Illinois and southern Iowa. In southern Indiana it is most common in July and August, when it is found on tall weeds and grasses in alluvial soils along the larger streams and the borders of ponds and marshes.

89 (126). *EUSCHISTUS VARIOLARIUS* (Palisot de Beauvois), 1805, 149.

Males elongate-oval, females more broadly so, surface subdepressed above, convex beneath. Above grayish- or greenish-yellow, marked with numerous rather sparsely placed, fuscous punctures; edge of side margins of thorax and extreme tip of scutellum yellow; antennæ reddish-yellow, the fifth joint and apical half of fourth, black or fuscous; membrane pale brown with vague rounded fuscous spots; under surface greenish-yellow; legs brighter yellow, flecked with small brownish dots; spiracle rings white; genital segment of male with a large rounded black spot at middle of base. Head longer than wide, its apex rounded; cheeks slightly concave, equalling or scarcely reaching tip of tylus. Pronotum with side margins very

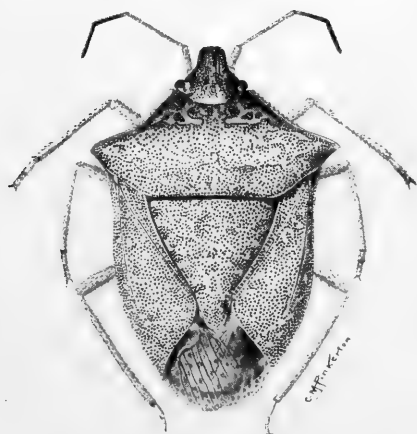


Fig. 28, X 4. (After Hart & Malloch).

broadly but evidently concave, the edge of their apical two-thirds finely crenulate; humeral angles acute or subspinose; disk with numerous irregular smooth areas, the punctures widely scattered, more dense along the margins. Scutellum with apical half sparsely punctate, the tip smooth. Elytra with finer punctures, sparsely placed. Connexivum very narrowly or not at all exposed. Thoracic pleura coarsely punctate; abdomen almost smooth, often flecked with minute reddish dots. Genital plate of male subtruncate or feebly sinuate. Length, 11.5—14 mm.; width, 8—9 mm. (Fig. 28).

Common throughout Indiana, Feb. 8—Nov. 28. Hibernates beneath cover, especially beneath basal leaves of mullein and old fence rails. Emerges about April 1st and from then on occurs on foliage and flowers of numerous plants, frequenting for the most part those found along the margins of upland fields and in open woodland pastures. Often frequent on red clover, mullein, evening primrose, thistle and burdock in June and July. On Oct. 10, I once found it by scores on the stems and leaves of the bouncing bet, *Saponaria officinalis* L. About mid-October the adults of the last brood began to seek their winter cover, but often emerge on warm days as late as Nov. 20, and sun themselves on the boles of trees and other convenient resting places.

In the northern States *variolarius* is one of the most common of the Pentatomids, ranging from Ontario and New England to British Columbia, Idaho and Kansas. It is seldom found south of latitude 37 degrees though I recorded it (1902, 224) from Ormond, Fla., and Barber (1914, 523) reports it from St. Augustine and Sanford, that State, these being the only previous definite records of its occurrence south of Kentucky and the District of Columbia. However, Brimley (Ms.) reports it as having been taken at five different stations in North Carolina, one of them being on Grandfather Mountain at an altitude of 5,000 feet. Of its food habits Forbes (1905, 195) states:

"We have repeatedly found it on corn sucking sap from the leaves, from the husks and kernels at the tip of the ear and from other parts of the plant. In Kentucky it has been found feeding at the base of the tobacco leaves, causing them to become limp and the stalk to wilt and fall. We have taken the adult on rye, red clover, broom-corn, oats, thistle and grasses, and they have been reported to eat tomatoes, raspberries, peaches, mullein and *Thermopsis*."

Olsen (1912, 53) states that 50 specimens were collected from the Rockaway Beach washup on May 1, and that it has

been "bred from egg to imago on pepper-grass, *Lepidium virginicum* L. and evening primrose, *Onagra biennis* L."

The general color of the upper surface of *variolarius* is paler, and the fuscous punctures are more sparsely placed than in most of our other species of the genus. The thoracic pleura are devoid of the usual two or three small black points and the apex of humeral angles is always acute or ends in a small spine. The male may always be known by the black spot being on the base of the genital plate, not on the sixth ventral as in the males of *tristigmus* with but one ventral spot present. Occasionally the genital plate is pushed so far back beneath the sixth ventral as to cover the spot. These characters will serve to separate the species even if the example in hand happens to be a female with black points on sides of abdomen. The *Pentatoma punctipes* Say (1825, 314) is a synonym.

90 (127). *EUSCHISTUS ICTERICUS* (Linnæus), 1763, 16.

Elongate-oval, distinctly tapering behind the humeri; subdepressed above, convex beneath. Above reddish-brown or reddish-yellow, thickly marked with fuscous punctures; antennæ reddish-yellow, joints 4 and 5 piceous, reddish at base; edge of side margins of pronotum, smooth line between its humeri, connexivum and tip of scutellum, yellow, often tinged with reddish; under surface yellow sprinkled with small reddish points; legs yellow with black dots; thoracic pleura with four very small black spots; spiracle rings fuscous. Head flat, distinctly tapering in front of middle, apex narrowly rounded, cheeks equalling tylus. Pronotum with front portion strongly declivent, the edge of side margins coarsely crenate; humeral angles elongate-triangular, directed slightly upward and outward, their tips usually spinose; disk with numerous smooth areas, the punctures sparsely, irregularly placed and with a smooth transverse line between the tips of the humeri. Basal half of scutellum with numerous narrow smooth transverse rugæ intervening between the irregular rows of punctures. Connexivum usually rather widely exposed. Thoracic pleura coarsely punctate; abdomen smooth or nearly so. Length, 11—11.5 mm.; width, 7.5—8 mm.

Frequent in northern Indiana, where it occurs from May to October on the tall grasses growing about the margins of lakes and tamarack swamps; taken only in Vigo County in the southern portion of the State. Ormond, LaBelle, R. P. Park and Dunedin, Fla., Nov. 22—April 1, taken by sweeping grasses and low shrubs along the margins of swales. Recorded from numerous other points in Florida and probably occurs throughout the State. Ashland, Mass., Oct. 15 (*Frost*). Van Duzee (1904, 47) says it is "found in the northern States and Canada

across the whole width of the Continent," but I can find no mention of its occurrence west of Colorado, and Zimmer and Stoner both report it very scarce in the states which they cover. Southwestward it ranges to Oklahoma and Texas. It appears to be everywhere a sub-aquatic species feeding or occurring on grasses, sedges and other vegetation growing in or close to water. Bueno and Englehardt (1910, 147) state: "A number were observed July 24 along the swampy margin of a bayou running through a cypress swamp, where they were resting on the leaves of water lilies and other plants, some mating.

From *variolarius*, to which it is closely allied, *ictericus* may be separated by the narrower, more tapering body, longer humeral angles with a smooth line between them, dark spiracles and the presence of black spots on thoracic pleura and absence of black spot on genital plate of male. The width across the humeral angles in *ictericus*, is distinctly greater than that across the middle of abdomen, whereas in *variolarius* and *bifibulus* it is subequal to the abdominal width.

91 (128). *EUSCHISTUS BIFIBULUS* (Palisot de Beauvois), 1805, 148.

Broadly oval, subdepressed above, convex beneath. Above dull brownish-yellow, marked with fuscous punctures, these more numerous on head and front half of pronotum, causing these parts to appear darker than those behind them, on the elytra in part aggregated in groups of 3 or 4 to form numerous small dark dots; antennæ and edge of tip of scutellum yellow; connexivum fuscous, each segment with a small median submarginal pale spot; membrane dark brown without fuscous dots; under surface yellow, ventrals with two rows of vague fuscous spots on each side; legs yellow, the middle and hind femora with a few brown dots. Head flat, its apex broadly rounded, cheeks equalling or very slightly exceeding tip of tylus; third joint of antennæ nearly one-half longer than second. Pronotum with front portion strongly declivent, its side margins slightly concave, humeri broad, subtriangular, their tips obtuse with a narrow smooth irregular line between them; hind portion short, rather sparsely unevenly punctate. Scutellum and elytra finely, rather evenly punctate throughout, the former with a few small slightly elevated smooth areas. Connexivum narrowly exposed. Genital plate of male broad, convex at middle, concave each side, its hind angles broadly rounded. Length, 10.5–12 mm.; width, 7–8 mm.

Ormond, Sanford, LaBelle, Moore Haven, Palmdale, Istok-poga, Chokoloskee, Caxambus, Sarasota and Dunedin, Fla., Nov. 29—April 15. Recorded from numerous other stations and doubtless occurs throughout the State. About Dunedin it

is, next to *servus*, the most common member of the genus, occurring on ferns and other vegetation in dense wet hammocks and sometimes beaten from the black mangrove along the bay beach. It is a neotropical species, known from this country only from Florida, Georgia and Texas, but found (*Stal*, 1872, 27) in Cuba, Mexico, Honduras and Colombia. The only Georgia station reported is Thomasville, by Barber (1906, 259).

92 (129). *EUSCHISTUS CRENATOR* (Fabricius), 1794, 101.

Obovate, or broadly ovate, small for the genus. Above grayish-yellow, rather densely marked with reddish-fuscescous punctures, these aggregated along the side margins of pronotum; scutellum and elytra with numerous small smooth whitish spots; connexivum fuscous, the middle of each segment with a pale spot; membrane grayish-brown without fuscous spots; under surface pale yellow; legs yellow marked with a few vague blackish dots; ends of ventral incisures with a black point. Head narrowed in front, its apex rounded; cheeks equalling tylus; third joint of antennæ nearly one-half longer than second. Pronotum with front side margins slightly sinuate, their edges strongly crenate or subserrate; humeri prominent, their tips acute or subspinose. Male genital segment as in key. Length, 9—9.5 mm.; width, 5—5.5 mm.

Duarte, Santo Domingo, July 21 (*Barber*). A West Indian and South American species, known in the United States from Florida, Texas, Arizona and California. While Van Duzee does not give Florida in his Catalogue distributional notes, it is recorded from that State by Uhler (1876, 286) and by Barber (1914, 522), who states there is a specimen in the National Museum from Dade City. Van Duzee (1907, 7) says that it is not uncommon in Jamaica, where it occurs singly on bushes and coarse weeds.

93 (132). *EUSCHISTUS CRASSUS* Dallas, 1851, 205.

Broadly oval, subconvex above, strongly convex beneath. Above grayish-yellow, marked with sparsely irregularly placed fuscous punctures; antennæ pale throughout; membrane as in key; connexivals fuscous, with a vague pale median spot; pronotum with a more or less evident dull yellow smooth line between the humeri, the punctures behind this more dense than elsewhere; under surface fuscous yellow; thoracic pleura with numerous coarse black punctures; legs yellow, thickly flecked with blackish dots. Head relatively narrow, its apex rounded; tylus slightly longer than cheeks. Pronotum with front portion strongly declivent, its side margins broadly concave, their edges rather coarsely crenulate; humeri prominent, ending in short acute forward and outward projecting spines; disk very unevenly punctate, with

numerous very irregular smooth spaces intervening. Scutellum with similar transverse smooth markings, its marginal punctures near base much coarser. Connexivum narrowly exposed, male, more broadly so, female. Abdomen alutaceous and finely, evenly, not closely punctate. Male genital plate appearing as if pinched, its median line with an obtuse ridge, its sides concave; hind margin subtruncate or slightly sinuate. Length, 10.5—11.5 mm.; width, 6—6.5 mm.

Dunedin and Sarasota, Fla., Nov. 17—April 12. Frequent about Dunedin in the fall and spring on weeds and low shrubs in open pine woods. Hibernates beneath bark and amongst the roots of tufts of grass. Described from St. John's Bluff, Fla., and recorded by Barber from seven other stations in the State. Known only from Georgia, Florida and North Carolina.

X. HYMENARCYS Amyot & Serville, 1843, 124.

Small or medium sized Pentatomids having the head porrect, as long as or longer than wide, tylus strongly convex, equalling the cheeks; antennæ slender, not surpassing base of pronotum; beak reaching beyond middle coxæ, its first and second joints subequal in length, third and fourth shorter, also subequal; pronotum with front portion gradually declivent, its humeral angles rounded, not prominent; scutellum relatively long, its apex rounded and almost reaching that of corium, the latter with apex straight, oblique, its outer angle acute; membrane equalling or but slightly surpassing tip of abdomen; tibiæ sulcate; osteolar opening without a canal, its auricle very short. Genital plate of males broad, concave each side, the hind margin broadly rounded, feebly sinuate.

In this genus and *Meneccles* the scutellum becomes wider behind, the apical third being almost as wide as that of corium, with tip more rounded than in preceding genera, thus approaching those genera under *dd* of the generic key, in which the tip of scutellum is wider than and surpasses that of corium. *Hymenarcys* is represented by but four known species, all confined to North America, two of them occurring in Mexico and the southwestern states, the others in our territory.

KEY TO EASTERN SPECIES OF HYMENARCYS.

- a.* Head longer than wide, its sides in front of middle parallel; veins of membrane furcate, not anastomosing; side margins of pronotum straight; smaller, length 6.5—8 mm. 94. *ÆQUALIS*.

aa. Head as wide or wider across the eyes than long, its sides in front of middle curved; veins of membrane anastomosing; side margins of pronotum broadly curved; larger, 9—11 mm. 95. NERVOSA.

94 (140). HYMENARCYS ÆQUALIS (Say), 1831, 7; I, 319.

Oblong-oval, subconvex. Above grayish- or brownish-yellow, thickly marked with reddish or fuscous punctures; antennæ yellow, flecked with reddish dots, apical joints fuscous; scutellum with a small whitish spot each side of apex; connexival segments fuscous with a median pale spot; membrane fuscous-brown; under surface yellow with numerous reddish points and punctures; legs yellow with purplish-red dots; spiracles, the front angle of the end of each ventral and the tip of beak blackish. Cheeks thickly punctate; tylus strongly convex, sparsely punctate; antennæ with joints 2—4 subequal, fifth longer. Pronotum with humeral angles obtusely rounded; disk rather sparsely unevenly punctate, with numerous irregular smooth areas. Scutellum and elytra sparsely, irregularly punctate; membrane just reaching tip of abdomen, its veins simple, oblique and parallel. Connexivum narrowly exposed. Length, 6.5—8 mm.; width, 4—5 mm.

Found throughout Indiana, but much more frequent in the southern portion, Feb. 7—Nov. 19. Occurs in summer on mullein, thistle and other plants in dry or sandy soils. In winter a common and gregarious species beneath logs, mullein leaves, etc. On one occasion, along the edge of the sandy bottoms of the Wabash River, 50 or more were found huddled together in the mould beneath an old half buried log, where they were keeping company with chinch bugs and the common lady beetle, *Mcgilla maculata* DeG.³⁴ They evidently begin to seek cover after the first frost, as on Oct. 16 three were sifted from the debris of a rotten chunk.

The species was described from Indiana, and ranges from New England west to Colorado, Montana and Saskatchewan, and south and southwest to Oklahoma and Texas. I have not taken it in Florida, nor is it included in Barber's "Hemiptera of Florida," but Van Duzee in his Catalogue includes that State in his distribution notes. In most places *æqualis* appears to be a scarce species, but few of the local lists mentioning the taking of more than one or two individuals; this, perhaps because the collectors do not seek for it in the proper places, or during its hibernating period. Uhler (1876, 287) states that "In Maryland it hibernates beneath stones in sheltered valleys, but

³⁴See Psyche, VII, 1895, 268.

is much less common than *neriosa*." Stoner (1920, 90) writes of its occurrence in Iowa as follows:

"Comparatively few specimens thus far obtained have been taken in sweeping, most of them having been collected either late in the fall or early in spring in places which they had chosen for hibernating. Individuals have been found under small rocks in more or less sheltered situations as early as Feb. 13, before the frost and ice in these places had melted. During the summer these rocky places were grown up in weeds and grass. On warm sunshiny days in late autumn and early spring specimens may often be found walking about on the sidewalks of cities. The few taken with the sweep-net were on low weeds and usually in more or less moist places."

95 (143). HYMENARCYS NERVOSA (Say), 1831, 9; I, 321.

Elongate-oval, subconvex. Above brownish-yellow, thickly and nearly evenly marked with fuscous punctures; antennæ reddish-yellow, the last joint fuscous; narrow edge of side margins of pronotum, a minute tooth at its front angles, and edge of tip of scutellum pale yellow; connexivum fuscous, each segment with median spot and edge yellow; under surface yellow with black punctures, each side with a rather broad interrupted black stripe; legs yellow dotted with black; spiracles and a spot at end of ventral incisures black. Head broad, rather sparsely punctate, the margins of cheeks rounded into apex; second joint of antennæ nearly one-half shorter than third. Pronotum with margins broadly curved; disk sparsely but rather evenly punctate, its sides somewhat flattened and with a broad vague concavity near base of humeri. Scutellum with a smooth space and small blackish concavity on each basal angle. Connexivum narrowly exposed. Length, 9—11 mm.; width, 5.5—7 mm.

Scarce in southern Indiana, not taken north of Marion Co., Feb. 6—Sept. 24. Hibernates as imago beneath logs and stones near the borders of woods and cultivated fields. Taken in summer by sweeping roadside herbage. Sarasota, Fla., Feb. 18, one specimen. Recorded also from Ft. Myers by Van Duzee (1909, 155) and probably occurs rarely throughout that State. Ranges from Quebec and New England west to Nebraska and Dakota and south and southwest to North Carolina, Oklahoma and Texas, but, like *aqualis*, usually scarce where found. Uhler (1876, 287) says that: "In Maryland it occurs with moderate frequency upon rank low herbage in meadows and about the skirts of woods. Like *Euschistus variolarius* and other species it becomes, when senile, suffused with red, is dusted with a whitish powder and seems then to have a more decidedly penetrative odor in the fluid which it sprays from the aperture of its glands."

. XI. MENECL³⁵ Stal, 1867, 527.

Oval, depressed species, above the medium in size, having the head large, porrect, flat, deeply inserted in thorax; cheeks slightly concave, equalling tylus; antennæ slender, joint 1 shorter than head, 2—4 subequal, 5 longer; beak reaching base of third ventral, its second joint almost as long as third and fourth united; pronotum large, disk with sides much flattened, and front margin deeply and broadly emarginate, side margins feebly but evidently curved; scutellum almost reaching the tip of corium, its apex rounded; membrane slightly surpassing abdomen, its veins anastomosing; connexivum rather broadly exposed; osteolar opening without a sulcus but possessing a prominent curved auricle; tarsi sulcate above. Genital plate of male broad, its sides concave, hind margin subtruncate, and with a broad shallow median emargination. But one species is known.

96 (155). MENECL³⁵ INSERTUS (Say), 1831, 6; I, 317.

Broadly oval, depressed, but little narrowed behind. Above grayish-yellow, everywhere thickly and evenly marked with rather small fuscous punctures; antennæ yellow, joints 4 and 5 piceous, paler at base; pronotum with a narrow smooth median line which extends back to middle of scutellum; connexivum sprinkled with fuscous punctures; membrane brown without dark spots; abdomen dull yellow with a median row of rather large black spots, its sides thickly covered with small fuscous punctures; thoracic pleura yellow with numerous coarse dark punctures; mesosternum with a black median shining spot; legs yellow thickly flecked with large black dots. Pronotum with humeri obtusely rounded; disk with front portion but slightly declivent, broadly and shallowly concave behind the front angles. Other characters as given under generic heading. Length, 12—14 mm.; width, 6.5—8 mm.

Marion, Putnam, Parke, Vigo, Knox, Posey and Crawford counties, Ind., April 27—Oct. 17 (*H. S. B.*). Not as yet taken in the eastern and northern portions of the State. Hopkinton, Mass., May 10 (*Frost*). In Indiana it has been taken for the most part singly while resting on the boles of trees, dead leaves, corded wood or some object of dull hue with which its color blended. I have never taken it by sweeping, and on but one occasion have I found more than one. This was on July 16,

³⁵The broad, subparallel form of body, deeply emarginate thorax for reception of head, wide apical portion of scutellum, anastomosing veins of membrane and form of the osteolar projection all show that *Menecl* is closely related to both *Hymenarcys* and *Cœnus*, and I have therefore placed it between the two instead of widely separating it from them as did Van Duzee in his Catalogue.

when three individuals were taken from the bole of a beech tree in a dense woodland near Indianapolis. It probably hibernates as imago as a single example was taken Oct. 17 from beneath a half buried log. The broad depressed form, with sides almost parallel from apex of pronotum to behind middle of abdomen; the wide, deeply inserted head, and broad flattened side margin of pronotum give this bug a peculiar appearance which makes its recognition easy.

While the known range of *M. insertus* extends from New England and Ontario west to Nebraska and Kansas and southwest to Arizona and California, it has not previously been recorded south of New Jersey and Arkansas. Brimley (Ms.) reports it as having been taken at Raleigh, N. Car., Oct. 1, 1917. Hart (1919, 189) mentions it as occurring at a number of stations in Illinois from March to November, and adds: "Its infrequency in collections is doubtless due to its arboreal habits. Van Duzee records its capture in numbers from small hickory trees; and in late October and early November we found it very abundant on sidewalks on the campus of the University of Illinois under a row of hard maple trees which it was presumably leaving for hibernation."

XII. CÆNUS Dallas, 1851, 230.

Oval, convex species of medium size having the head porrect, longer than wide, tapering in front, its apex rounded; tylus as long as cheeks, strongly convex and elevated above their plane; antennæ slender, basal joint shortest, second three-fourths the length of third, the latter longer than fourth, fifth longest; beak reaching middle of hind coxæ, its second joint longer than third and fourth united; pronotum with front portion feebly declivent, its apex deeply emarginate, side margins straight, humeral angles rounded; scutellum broad, its apical third wider than and slightly surpassing the corium, its tip broadly rounded; corium with apex subtruncate, its angles rounded; membrane reaching tip of abdomen, its veins anastomosing; connexivum not exposed; osteolar opening with a very short auricle; tarsi sulcate above. Genital plate of male with apex broadly emarginate, the notch with a distinct median tooth. But one species is known.

97 (139). *CÆNUS DELIUS* (Say), 1831, 8; I, 320.

Oval, subconvex above, strongly convex beneath. Above dull yellow, thickly and rather evenly marked with fuscous punctures; tylus and narrow edges of sides of pronotum yellow, impunctate; antennæ with joints 2, 4 and 5 fuscous, 3 reddish-yellow; membrane hyaline, the veins fuscous; under surface dull yellow, with abdomen alutaceous and densely irregularly covered with fine blackish punctures; thoracic pleura with coarse scattered similar punctures; legs yellow, thickly flecked with small purplish and larger black dots, tarsi and spiracles fuscous. Structural characters as above given. Length, 8.5—10.5 mm.; width, 4.5—6 mm.

Laporte, Marion and Vigo counties, Ind., Aug. 5—Oct. 16. Swept from tall grass on the former date, taken from beneath a log on the latter. This appears to be one of the scarcer Pentatomids in Indiana, but six specimens being at hand. Its known range is a wide one, extending from Quebec and New England west to British Columbia and Montana and south and south-west to Oklahoma (and Texas?). Van Duzee (1904, 49) states that—"Its southern range includes Florida and Texas," but I have not taken it in Florida nor does Barber record it from there. In fact, the most southern previously definitely mentioned stations are "Ft. Cobb, Indian Territory," by Uhler (1872, 396) and various points in New Jersey by Smith (1910, 135). However Brimley (Ms.) reports it from Blowing Rock and Grandfather Mountain, N. Car.

Of its habits Van Duzee (1894, 171) says that about Buffalo, N. Y., it is "common in dry fields and pastures throughout the season. In September I found a dozen or more individuals gathered on a bruised sweet apple, the juice of which they were eagerly imbibing." Olsen (1912, 53) states that he has kept the adults in captivity for two months by feeding them on moth mullein. Stoner (1920, 88) mentions its habits in Iowa as follows:

"Timothy and clover fields, particularly those in more or less moist situations, are the places most frequently chosen by this insect. The vegetation of semi-cultivated roadsides will frequently harbor it in some numbers, especially if there is more or less timothy and blue grass present. Low-lying blue-grass pastures are also favored habitats. Hibernating forms are not uncommon, and specimens may be found in early spring under boards, sticks and rubbish in pastures and along the grassy edges of fields. Judging from the material at hand, this species breeds rather later in the year than most of our Pentatomids, and with us appears to be single brooded. All the nymphs have been taken in July."

XIII. NEOTTIGLOSSA Kirby, 1837, 276.

Small, oblong-oval convex species having the head strongly deflexed; cheeks longer than tylus and usually meeting in front of it; antennæ slender, scarcely reaching base of pronotum, the third joint shorter than second, the fourth and fifth thicker and longer; beak usually reaching middle of hind coxæ, its second joint as long as third and fourth united; pronotum with a more or less evident transverse median groove, the front portion but slightly lower than the hind one, side margins straight, humeri rounded, not prominent; scutellum broad, but little narrowed behind, its apex wider than and surpassing that of corium; membrane reaching tip of abdomen, hyaline, its veins simple; connexivum very narrowly or not at all exposed; osteole not or slightly prolonged as a wrinkle beyond the opening, but without auricle or canal; tibiæ not or very faintly sulcate above. Genital plate of male semi-circular, almost perpendicular, its hind margin truncate.

About 15 species are known, most of them palæarctic in distribution. Four of them occur in the United States, all in our territory. They are found mostly on grasses and clover in open fields and meadows.

KEY TO EASTERN SPECIES OF NEOTTIGLOSSA.

- a. Head triangular, narrowed toward apex, its front not deeply concave.
 - b. Cheeks with margins sinuate or very feebly notched in front of eyes, their disks but little raised above their margins.
 - c. Head not black, rather finely, not densely and deeply punctate; occiput with a narrow median pale line which extends back onto pronotum; length, 4.5—5.5 mm. 98. UNDATA.
 - cc. Head wholly black, feebly bronzed, deeply and densely punctate; occiput without a pale line; length, 5.5—6 mm. 99. TRILINEATA.
 - bb. Cheeks with margins distinctly notched in front of eyes, their disks coarsely, deeply and densely punctate, strongly tumid and raised above the margins; occiput without pale line; length, 4—4.5 mm. 100. SULCIFRONS.
 - aa. Head broadly oval, not narrowed toward apex, its front broadly and deeply concave; length, 4—4.5 mm. 101. CAVIFRONS.
- 98 (145). NEOTTIGLOSSA UNDATA (Say), 1831, 8; I, 319.

Oblong-oval, convex above and beneath. Above grayish-yellow, rather evenly marked with small black punctures; a narrow smooth slightly raised median line extending from base of tylus nearly to apex of scu-

tellum, edge of side margins of pronotum and connexivum and a short calloused line on each basal angle of scutellum, pale yellow; antennæ reddish-yellow, the last two joints fuscous; thoracic pleura dull yellow, thickly marked with coarse black punctures; legs yellow, the femora with purplish dots; abdomen piceous, feebly bronzed, finely and evenly punctate, its side margins yellow. Head convex, its side margins smooth and apex subacute; cheeks usually meeting in front of tylus, the latter with a few coarse punctures. Third antennal three-fourths the length of second. Pronotum with scattered small irregular spots and narrow transverse lines smooth; otherwise rather evenly punctate. Hind margin of genital plate of male with a small median notch. Length, 4.5—5.5 mm.; width, 3—3.5 mm.

Lake and Marion counties, Ind., June 4—Sept. 1; swept from grass along roadsides in low alluvial soil. Elizabeth and St. Joseph, Ill., June 27—July 7 (*Hart*). Apparently a scarce species in Indiana. Ranges from Quebec and New England westward across southern Canada and the northern states to the Pacific; the only record of its occurrence south of New Jersey and central Illinois being that of Bueno for Southern Pines, N. Car. Of its occurrence and habits in Iowa Stoner (1920, 93) has written: "Common in suitable situations and in some seasons even abundant under favorable conditions. Almost any field of timothy or blue-grass will yield numbers of these bugs during the summer months. Specimens are also sometimes taken from red clover, mullein and riverside grape. Adults are most common in July. Hibernating individuals have been found in March and April under rocks in out-of-the-way places which have been permitted to grow up in weeds and grass during the summer."

99 (146). *NEOTTIGLOSSA TRILINEATA* Kirby, 1837, 276.

Larger than *undata*, to which it is closely allied. Head and front half of pronotum black; elytra and basal half of pronotum dull yellow with fuscous punctures; median line of pronotum and a small spot behind each callosity yellow, side margins white. Scutellum testaceous, basal angles and a spot on apex blackish, disk with a median yellow line extending from base to apical third, this crossed at middle of scutellum by a transverse yellowish line which unites with a sublateral line each side, extending to base of scutellum, thus forming a trident marking. Corium with two piceous spots on apical margin; membrane and connexivum white; dorsum black; under surface bronzed-black, closely punctate; legs yellowish, femora and tibiæ with black lines or spots; third tarsal joint piceous. Head less abruptly deflexed with apex less acute than in *undata*. Third antennal relatively longer, only one-ninth shorter than second. Beak nearly reaching hind coxæ. Pronotum with side margins

straight, impunctate, broader than in *undata*; front half closely punctate, hind one more sparsely punctate. Length, 5—6 mm.

A species of northern distribution, its known range extending from Nova Scotia, northern Michigan and Nebraska to British Columbia and California. Hussey (1922b, 85) gives in detail the differences between it and *undata*.

100 (147). *NEOTTIGLOSSA SULCIFRONS* Stal, 1872, 18.

Oblong-oval, convex above and beneath. Above dull reddish or brownish yellow, the head, front portion of pronotum, basal third and narrow median line of scutellum, black, opaque or feebly bronzed; narrow edge of side margins of pronotum and elytra and a short curved calloused line each side of base of scutellum, pale yellow; antennæ reddish-yellow, the last two joints dusky; entire under surface bronzed; legs yellow throughout. Head convex, narrowed in front; cheeks longer than tylus, contiguous in front, separated from it each side by a distinct groove, their margins notched and strongly sinuate in front of eyes, otherwise as in key. Pronotum with disk evenly punctate, often with a small pale calloused spot each side of middle. Scutellum evenly and coarsely punctate throughout except on basal calloused lines. Abdomen finely and evenly punctate, thoracic pleura more coarsely and densely so. Osteolar opening prolonged as a fine distinct tapering ridge. Hind margin of male genital plate entire. Length, 4—5 mm.; width, 2.5—3 mm.

Marion, Lawrence and Martin counties, Ind., May 30—Aug. 25; beaten from oak and swept from timothy meadows and roadside herbage. Not taken in the northern half of the State. It is among the smallest of our Pentatomids and readily separated from our other species by its color and the characters given in key. Stal's type was from Texas, and it is a species of southern range, extending from New Jersey westward, south of central Indiana and Illinois and northern Iowa, to Nebraska, Kansas and New Mexico. Recorded from North Carolina and Georgia but not as yet from Florida. Uhler (1877, 402) states that near Baltimore, Md., he swept numerous specimens of it from weeds in July. Stoner (1920, 95) states that in Iowa "hibernating individuals have not been discovered and practically all the specimens have been swept from sparsely growing blue-grass and timothy." The nymphs of the third and fourth stage are curious oblong, strongly convex creatures, bright yellow in hue with four black stripes along the entire upper surface.

101 (148). *NEOTTIGLOSSA CAVIFRONS* Stal, 1872, 18.

Oblong-oval, convex above and beneath. Above black or piceous-black, shining; elytra and sometimes the basal portion of pronotum dull brownish-yellow; usually two small spots on occiput, two near middle of pronotum and a feebly curved short line each side of base of scutellum, calloused and ivory-white; basal joints of antennæ reddish-yellow, fourth and fifth fuscous; under surface black, faintly bronzed; legs yellow, the narrow edge of abdomen and sometimes of pronotum ivory-white. Head very broad, densely and finely punctate, its apex broadly rounded, the entire deflexed front hollowed out to form a deep regular almost circular concavity; tylus flat, surpassed by cheeks, which are contiguous before it. Pronotum and scutellum evenly, densely and shallowly punctate, the side margins of former a little concave. Under surface finely and evenly punctate. Genital plate of male rather narrow, its middle feebly depressed, its apex truncate, entire. Length, 4—5.2 mm.; width, 2.5—3 mm.

Dubois and Knox counties, Ind. (*W. S. B.*). Dubois, Ill., May 23 (*Hart*). The Indiana specimens were taken May 14, by sifting debris at the base of stumps and July 7 by sweeping bush clover, *Lespedeza*, on the top of a high sandy knoll. Stal's types were from Texas and it is listed by Van Duzee only from that State, Utah and California. East of the Mississippi it is known only from the southern fourth of Illinois and southern Indiana. Hart (1919, 187) states that it "is not uncommon in southern Illinois from April 28 to July 21, with nymphs on June 20 and July 9. One of the nymphs was taken on *Pycnanthemum*." Van Duzee (1904, 50) says that *cavifrons* and *sulcifrons* "are close and possibly should be considered but varieties of a single form." The structure and shape of the head in the two is entirely different and there is no doubt but that they are very distinct.

XIV. *COSMOPEPLA* Stal, 1867, 525.

Species of small size and oval convex form having the head moderately declivent, as long as or longer than broad, cheeks equalling the tylus; antennæ slender, pubescent, reaching base of pronotum, second and third joints subequal, fourth and fifth stouter, the fifth the longest; beak reaching base of second ventral, its first segment one-half longer than bucculæ, second a little shorter than third and fourth united; pronotum with front portion strongly declivent, its side margins almost straight, humeral angles obtusely rounded; scutellum broad, reaching or a little surpassing tip of corium, its apex broadly

rounded; frena in our species less than one-half its length; membrane hyaline, slightly surpassing abdomen, its veins simple; connexivum narrowly exposed; osteolar opening with auricle very small, scarcely evident; tibiæ not sulcate. Genital plate of male short, broad, its hind margin subtruncate and reflexed.

Seven species are known from the American Continent, five of which occur in the United States, but only one is definitely known from our territory.³⁶

102 (149). *COSMOPEPLA BIMACULATA* (Thomas), 1865, 455.

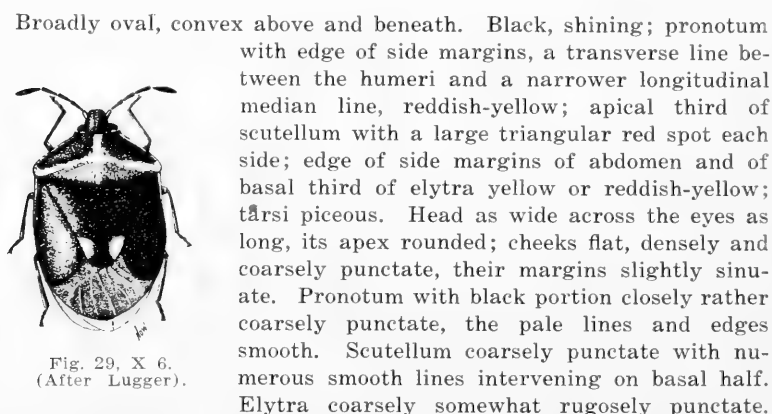


Fig. 29, X 6.
(After Lugger).

Broadly oval, convex above and beneath. Black, shining; pronotum with edge of side margins, a transverse line between the humeri and a narrower longitudinal median line, reddish-yellow; apical third of scutellum with a large triangular red spot each side; edge of side margins of abdomen and of basal third of elytra yellow or reddish-yellow; tarsi piceous. Head as wide across the eyes as long, its apex rounded; cheeks flat, densely and coarsely punctate, their margins slightly sinuate. Pronotum with black portion closely rather coarsely punctate, the pale lines and edges smooth. Scutellum coarsely punctate with numerous smooth lines intervening on basal half. Elytra coarsely somewhat rugosely punctate. Abdomen finely and rather sparsely punctate, the thoracic pleura more coarsely and densely so. Length, 5—7 mm.; width, 3—4.2 mm. (Fig. 29).

Common throughout Indiana, May 5—Oct. 16. Occurs on the foliage and flowers of many plants, especially those of oats, mullein, bouncing-bet, greater ragweed and goldenrod. Found mating on May 5 and June 19. Ranges from Nova Scotia and New England, west to British Columbia and Washington, and south to Georgia, Texas and Mexico. Not as yet recorded from Florida, though it possibly occurs in the northern third of that State. It has been generally known as *C. caruifex* (Fabr.), but Kirkaldy (1909, 80) showed that that name was preoccupied and renamed it *C. linteicaria*. Thomas, however, had previously described it (loc. cit.) as *Pentatoma bimaculata*.

This prettily colored little bug appears to be abundant over much of its wide range. Van Duzee (1894, 170) states that at

³⁶Montandon (1893, 49) says that he has seen a specimen of *C. binotata* Dist., from Wisconsin, in the Lethierry collection. As it is known elsewhere only from Mexico and Arizona, it was probably wrongly labelled or an adventive.

Ridgeway, Ontario, he once found them mating, May 31, on wild columbine and that they were present in such numbers as nearly to cover the plants. Hart (1907, 238) mentions it as occurring at Havana, Ill., "on *Scrophularia nodosa* and other plants among the black-jack oaks, clustered along the stems." Olsen (1912, 54) has bred it from egg to imago on moth mullein and states that "a male has been observed to prey upon the eggs deposited by its mate, completely draining their contents." Other food plants which have been mentioned by authors are *Ranunculus*, currant, blackberry, mint, potato, raspberry, thistle, nettle and pokeberry.

XV. *LOXA* Amyot & Serville, 1843, 137.

Very large, broadly oval convex species having the head long, triangular, almost porrect, bifid at apex; cheeks flat, much longer than tylus, their side margins straight and tips subacute and separated; beak reaching to or beyond middle of third ventral, its first joint longer than bucculæ, second almost as long as third and fourth united; antennæ very slender, surpassing base of pronotum, first joint stoutest, as long as head, 3—5 subequal, each slightly longer than second; pronotum with front portion declivent, its side margins straight, strongly crenulate; humeral angles prominent, acutely produced in an upward and outward projecting spine; scutellum with apical half much narrowed, scarcely surpassing middle of abdomen, its apex much narrower than that of corium; connexivum narrowly exposed; membrane with veins simple; femora with a short obtuse spine at apex above; tibiæ narrowly sulcate; os-teolar opening with a large, feebly curved auricle.

A half dozen or more species are known from tropical America, but only one from the eastern United States.

103 (171). *LOXA FLORIDA* Van Duzee, 1909, 156.

Broadly oval, subconvex above, rather strongly convex beneath. Above pale green, marked with numerous very small brownish-red punctures; narrow edge of head, serrations of pronotum and basal half of costal edge of elytra, pale yellow, bordered within by a scarlet-red line; spines scarlet; disks of pronotum and scutellum with numerous short transverse slightly elevated pale rugæ; corium with scattered small rounded pale spots; membrane hyaline with scattered green dots; antennæ and legs greenish-yellow; under surface dull greenish-yellow. Head

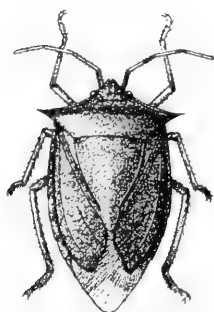


Fig. 30, X $1\frac{1}{2}$.
(After Van Duzee).

regularly tapering from the eyes forward, impunctate, its basal half with numerous very fine transverse wrinkles. Pronotum and scutellum with the small punctures in irregular transverse rows between the much broader, broken transverse rugæ. Elytra sub-alutaceous, evenly, sparsely and very finely punctate. Under surface finely and sparsely punctate. Genital plate of male widely and very deeply emarginate or bi-lobed, each lobe with its inner margin deflexed and apex obtusely rounded. Length, 21—23 mm.; width, 12—14 mm. (Fig. 30).

Dunedin, Miami and Key West, Fla., Nov. 30—April 1. About a dozen specimens have been taken at Dunedin. They were swept singly from foliage along the margins of orange groves and cultivated grounds. Known only from Florida, the type from Crescent City and the other half dozen recorded stations ranging from Jacksonville to Big Pine Key. It is one of the largest and most handsome of our eastern Pentatomids.

XVI. MURGANTIA Stal, 1862, 105.

Oblong-oval, subdepressed species of medium size having the head broad, triangular, strongly deflexed; cheeks with side margins elevated and thickened, their tips not reaching that of tylus; beak stout, reaching middle of hind coxæ, its second joint as long as third and fourth united; pronotum short and wide, with both front angles and humeri obtusely rounded, its disk almost smooth, with front portion feebly declivent; scutellum elongate, strongly tapering, its tip narrowly rounded, frena reaching its apical fourth; membrane surpassing abdomen, its veins simple; connexivum narrowly exposed; tibiæ sulcate above only on apical half; osteolar opening very small, without auricle or canal. Genital plate of male short, wide, its hind margin thickened and broadly shallowly concave.

This genus is represented by a half dozen or so species, most of which occur in South America. Two are known from our territory.

KEY TO EASTERN SPECIES OF MURGANTIA.

- a.* Color above black with orange-red and yellow markings. 104. HISTRIONICA.
- aa.* Color above violet-blue with yellowish-white markings. 105. VIOLASCENS.

104 (172). *MURGANTIA HISTRIONICA* (Hahn), 1834, 116.

Oblong-oval, subdepressed above, more convex beneath. Head black, each cheek with a large triangular yellow spot; antennæ black, the basal joint in part paler; pronotum orange-red, its front margin paler at

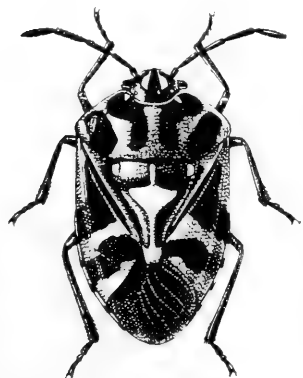


Fig. 31. X 4.
(After Chittenden).

middle; disk with a wide, irregular, often interrupted, crescentic black spot behind each apical angle; scutellum black, its base with three small yellow spots, the tip and a central cross orange-red; elytra orange-red with a large transverse black spot in front of middle and another at apical fourth; membrane black, paler toward tip; abdomen black, shining, with seven rows of paler spots, those of the median row and the outer two rows on each side yellow, those of the other two rows larger and in great part orange; thoracic pleura black, each with one or two paler spots; legs black, the femora with yellowish lines and spots. Head and pronotum almost smooth,

the latter with margins thickened and disc with a single submedian curved row of small punctures. Scutellum with base smooth, the apical half with a few punctures and narrow transverse impressed lines. Elytra finely, evenly and shallowly punctate. Under surface almost smooth. Length, 9—11.5 mm.; width, 5.5—6.5 mm. (Fig. 31).

Crawford, Spencer, Perry and Posey counties, Ind., May 8—Oct. 22; Chokoloskee, Fla., Oct. 20; Orizaba, Mexico, July 28 (*H. S. B.*). Agricultural College, Miss. (*Wcd*). The Indiana specimens were taken from cabbage and other cruciferous plants, to which it often does much injury. It is a species of southern range, which has gradually spread northward, its known present distribution extending from New England west to Colorado and south and southwest to southern Florida, Texas, California and Mexico. It is not common in Florida, the only previous definite station recorded being based upon specimens from Lake City in the Gainesville collection. Chittenden (1908) has given the most comprehensive description of the distribution, habits and remedies for this bug, and from it I quote as follows:

“A moderate-sized red and black plant-bug, variously known as ‘calico back,’ ‘fire bug’ and ‘terrapin bug,’ as well as harlequin cabbage bug, is the most destructive insect enemy of cabbage and related crops in the southern part of the United States. It accomplishes its work of destruction by sucking the sap from leaves and veins of cabbage and

other crucifers, the affected plants wilting, withering and dying as if they had been swept by fire, whence the name 'fire bug.' A half dozen mature insects are capable of destroying a small plant in one or two days. Some years ago the writer saw many large fields in Maryland and Virginia from which not a single good cabbage could be picked, and observed similar injury to horse-radish and some other crucifers.

"The eggs are beautiful objects and remarkable for the fact that they closely imitate in miniature white barrels bound with black hoops and with black spots set in the proper place for bung holes. The younger stages, or nymphs, of this species bear considerable resemblance to the mature form, differing, however, in the lack of wings and in having only four joints to the antennæ, whereas the adults have five.

"The experience of years has shown that in order to obtain the best results in the treatment of the harlequin cabbage bug preventives are necessary, as there is great difficulty in obtaining insecticides which are effective and which do not at the same time injure or kill the plants. These preventives are: clean cultural methods, especially in the fall; the use of trap crops of mustard or other plants in the spring, and hand picking, the large size and bright colors of the insect rendering it easy of detection and its sluggish nature assisting in its easy capture."

105 (174). *MURGANTIA VIOLASCENS* (Westwood), 1837, 34.

Oval, subdepressed. Above dark blue, shining; a small crescent on each cheek, side margins, a cross on disk and part of hind margins of pronotum, side margins and median line of scutellum, a forked transverse line on apical third of corium and incisures of antennæ and connexivum, ivory-white; membrane blackish-blue, the margins pale; under surface and legs ivory-white, the margins of sterna and ventrals and some lines on femora and tibiæ, dark blue or fuscous-brown. Pronotum with a deep submedian transverse punctured groove. Other structural characters as under generic heading. Length, 8—9 mm.

Lignum-vitæ Key, Fla., February (*Barber*). A West Indian species recorded also from Key Largo, Fla. Not known in the United States outside of that State. The pale margins of scutellum join the median line at apical fifth.

SUBTRIBE III OF PENTATOMINI.

To this group or subtribe belong those genera of the tribe Pentatomini whose members have the middle of second ventral armed with a tubercle or spine which projects forward towards or between the hind coxæ. They vary much in size and color, but all have the body oval, more or less convex; head porrect or feebly declivent, cheeks equalling or exceeding tylus; pronotum with humeral angles (except in *Arvelius*) not spined, its

side margins usually entire; scutellum strongly tapering, its apex narrower than and not reaching the outer apical angle of the corium; osteolar opening with either a distinct auricle or canal. Nine of the 25 genera of the tribe belong in this group.

KEY TO EASTERN GENERA OF SUBTRIBE III OF PENTATOMINI.

- a.* Cheeks not surpassing tylus, or, if slightly so, not contiguous in front of it.
- b.* Ventral spine not reaching middle coxæ.
- c.* First joint of antennæ passing apex of head, second about half the length of third; color black and red or black and violet.
XVII. VULSIREA, p. 158.
- cc.* First joint of antennæ not passing head, second usually more than half the length of third; color not as above.
- d.* Larger, length 14 or more mm.; second antennal more than half the length of fifth; color usually clear green.
- e.* Spine of second ventral very short and obtuse; osteolar canal short, subtruncate, not reaching middle of its supporting plate; hind margin of genital plate of male with a broad and very deep U-shaped emargination. XVIII. NEZARA, p. 158.
- ee.* Spine of second ventral distinct; osteolar canal long, tapering, much surpassing middle of its supporting plate; hind margin of male genital plate shallowly emarginate or subtruncate.
XIX. ACROSTERNUM, p. 160.
- dd.* Smaller, length not over 11 mm.; second antennal joint less than half the length of fifth; color olivaceous green or darker; ventral spine short, tuberculate.
XX. BANASA, p. 163.
- bb.* Ventral spine reaching or slightly surpassing middle coxæ; spiracles large, black.
XXI. PIEZODORUS, p. 169.
- aa.* Cheeks surpassing tylus.
- f.* Tips of cheeks acute, not approaching or contiguous; humeri ending in a strong upward and outward projecting spine; mesosternum with a prominent acute median carina.
XXII. ARVELIUS, p. 171.
- ff.* Tips of cheeks obtuse, approaching or contiguous in front of tylus; humeri not spined; mesosternum not acutely carinate.
- g.* Side margins of pronotum with filamentous teeth; body hairy.
XXIII. NEOPHARNUS, p. 172.
- gg.* Side margins of pronotum without filamentous teeth; body glabrous.
- h.* Side margins of pronotum not crenulate; form short, broadly oval; osteolar sulcus elongate, tapering into a narrow ridge; length less than 9 mm.
XXIV. DENDROCORIS, p. 173.
- hh.* Side margins of pronotum crenulate; form elongate-oval; osteolar canal short, its tip obtuse; length 11 or more mm.
XXV. BREPHOLOXA, p. 175.

XVII. VULSIREA Spinola, 1840, 350.

Large broadly oval species having the head small, porrect, its apex rounded; cheeks equalling tylus, impunctate, their edges thickened, reflexed, forming a cavity above tip of tylus and another each side in front of eyes; beak reaching between hind coxæ, its second and third joints subequal, fourth shorter than either; pronotum short, very broad across the humeral angles, the latter obtuse, disk with but a few scattered very coarse punctures; scutellum relatively small, strongly narrowed toward the obtusely rounded apex which passes but slightly the inner apical angle of corium; connexivum almost wholly exposed; membrane slightly surpassing abdomen, its veins few, forked; under surface smooth, feebly convex. One species occurs in Florida.

106 (176). VULSIREA VIOLACEA (Fabricius), 1803, 167.

Broadly oval, subdepressed, widest behind the middle. Color variegated and variable. The specimen at hand is bright red with head, antennæ, beak, legs and pro- and meso- sterna black; a large round spot behind each front angle of pronotum, an irregular cross-bar on basal thirds of both pronotum and scutellum and the entire elytra blue-black; connexival segments with a black bar at each end; under surface with a row of rounded spots each side, and the incisures at ends of ventrals black; apex of sixth ventral and genital plate of male black. Joints 3—5 of antennæ subequal, finely pubescent. Disk of pronotum uneven, strongly narrowed from humeral angles to apex, its side margins evidently but not strongly concave, with edges obtuse, not reflexed. Scutellum with apical half appearing as if pinched, its center with an obtuse ridge and sides flattened; disk with but few scattered very coarse punctures. Corium very finely, sparsely and irregularly punctate, the apical margin sinuate. Other characters as above given. Length, 18 mm.; width, 10.5 mm.

Royal Palm Park, Fla., March 15; one male taken while beating in the west end of hammock on Paradise Key. A neotropical species occurring in Central America, Mexico and the West Indies. Known in this country only from two or three specimens taken at Biscayne Bay and other places in extreme southern Florida. One of the largest and most handsome of American Pentatomids and said to be extremely variable in color.

XVIII. NEZARA Amyot & Serville, 1843, 143.

Large, broadly oval subconvex species having the head porrect, but little longer than broad, its apex rounded; cheeks flat,

reaching tip of tylus, their margins sinuate; beak reaching or surpassing middle of hind coxæ, its first joint as long as bucculæ, second about as long as third and fourth united; antennæ slender, basal joint stout, about one-third the length of second, 3—5 subequal, each slightly longer than second; pronotum with front portion gradually declivent, its side margins straight, humeri obtusely rounded; scutellum with apical half strongly tapering, the tip narrowly rounded; membrane slightly surpassing abdomen, its veins in part anastomosing; connexivum rather broadly exposed; abdomen with a low obtuse median carina; tibiæ sulcate. Genital plate of male broadly and deeply emarginate, the middle or base of notch slightly prolonged into a short rounded lobe, behind which is a subcircular concavity.

One cosmopolitan species occurs in the eastern United States.

107 (178). *NEZARA VIRIDULA* (Linnaeus), 1758, 444.

Oval, subconvex above, more convex beneath. Above clear green, rarely tinged with reddish-fuscous; narrow edge of side margins of head, pronotum and sometimes of connexivum yellowish; antennæ green, the fifth joint, apical two-thirds of fourth and tip of third, reddish-fuscous; extreme base of scutellum with three or four small whitish calloused spots, also a minute black dot on each basal angle; under surface pale green, the coxæ, thoracic groove and abdominal median ridge yellowish-white. Entire upper surface finely and closely punctate, the pronotum and scutellum with minute rugæ between the punctures, giving them a granulate and subopaque appearance. Thoracic pleura finely and sparsely punctate, abdomen more closely and rugosely so, the median ridge smooth. Structural characters as given above. Length, 14—17 mm.; width, 7—8.5 mm.

Ormond, Lakeland, Moore Haven, Cape Sable, Caxambus, Ft. Myers and Dunedin, Fla., Nov. 19—April 4. About Dunedin it is of frequent occurrence, especially in late autumn when it is taken by sweeping soybeans, and in early spring by beating foliage in or along the margins of wet hammocks. It hibernates as imago, and several specimens taken in January were strongly tinged with fuscous above and reddish beneath. Barber records it from a dozen or more stations in Florida in addition to those given, and it doubtless occurs throughout the State. Elsewhere in the United States it is recorded only from Virginia, Louisiana and Texas. Bueno (1912, 316) also mentions the taking of a specimen, probably adventive, in a greenhouse at Brooklyn, N. Y., and states that:

"Owing to its variable nature and world-wide distribution, it has been redescribed (since the days of Linnæus) under no less than 21 different specific names. . . . There is no reason why it should not be able to establish itself here as it is quite at home in Germany and Russia, where the winters are no warmer than in the United States. It is recorded as feeding on orange, Celtis, mulberry, rice, sugar-cane, cotton, maize and potato."

Morrill (1910, 82) states that at Quincy, Fla., in October and November, 1905, this bug was very abundant, destroying potato vines and occurring commonly on cotton. Late in October there were on each potato vine an average of between three and five adults and 15 and 20 nymphs. The attacked vines turned dark and finally wilted.

XIX. ACROSTERNUM Fieber, 1861, 79.

This genus is very close to *Nezara*, the only differential characters of importance being those given in the generic key. It is very doubtful whether it should be considered as more than a subgenus of *Nezara*, though all our recent writers have separated the two. The genus is a large one, nearly 60 species being known from various parts of the world. Only three have been taken in the United States. all of which are known from our territory.

KEY TO EASTERN SPECIES OF ACROSTERNUM.

- a. Form short, oval; head distinctly broader across the eyes than long; cheeks slightly exceeding tylus; sides of pronotum broadly curved. 108. PENNSYLVANICUM.
 - aa. Form elongate-oval; breadth of head across the eyes not, or but slightly, exceeding its length; tylus equalling cheeks; sides of pronotum straight or nearly so.
 - b. Spine of second ventral scarcely reaching middle of hind coxæ; apex of male genital plate subtruncate, sinuate and with a slight median notch, its outer apical angles subacute. 109. HILARE.
 - bb. Spine of second ventral reaching or passing front edge of hind coxæ; apex of male genital plate with a broad shallow V-shaped emargination, its outer apical angles obtuse. 110. MARGINATUM.
- 108 (179). ACROSTERNUM PENNSYLVANICUM (De Geer), 1773, 330.

Broadly oval, obtusely rounded behind. Above green, shining; antennæ green, the apical two-thirds of joints 4 and 5 and the tip of 3 fuscous; membrane brownish; under surface green or greenish-yellow,

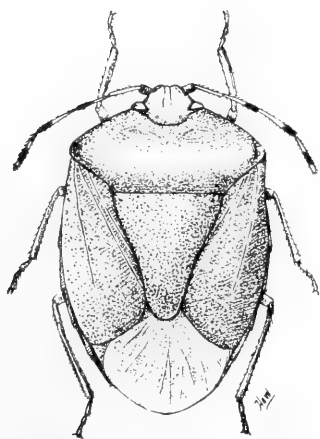


Fig. 32, X 3. (After Lugger).

the spiracles and tips of apical angles of ventral segments black. Head very wide, slightly concave, its apex broadly rounded. Beak not passing middle coxæ. Pronotum with side margins faintly but evidently curved, the humeri broad, obtusely rounded; disk finely and closely punctate, with short, minute oblique rugæ-intervening. Scutellum more irregularly punctate, the rugæ on basal half more distinct. Elytra alutaceous, finely, evenly and shallowly punctate. Abdomen without a median ridge, finely and rugosely punctate. Apex of genital plate of male slightly concave and with a small but distinct median notch. Length, 13.5–14.5 mm.; width, 9–9.5 mm. (Fig. 32).

Starke Co., Ind., June 17; Ormond and Dunedin, Fla., Nov. 16—April 15. In Florida it was beaten from juniper, has been recorded from several stations between Jacksonville and Lake Okeechobee, and probably occurs sparingly throughout the State. Its known range extends from Quebec and New England west to Iowa and south to Georgia, Florida (and Panama?), but everywhere so far reported it appears to be scarce in numbers. Uhler mentions it twice (1871, 1878) from Panama, but there are no records between there and Georgia, where Say's type of *Pentatoma abrupta*, a synonym, was obtained. Nothing regarding its food plants has been recorded, though Banks has taken it on Jersey-tea, *Ceanothus*. According to Parshley (1923, 767) only three specimens are known from New England.

109 (181). *ACROSTERNUM HILARE* (Say), 1831, 5; I, 304, 316.

Elongate-oval, tapering from humeri to apex, the latter narrowly rounded. Green, shining, narrow edge of side margins of head, pronotum and connexivum pale yellow or reddish-yellow; antennæ green, joints 2–5 subequal, the tip of third and apical half of fourth blackish, fifth pale at base, then blackish, the tip reddish; membrane pale hyaline; under surface green, its middle dull yellow; spiracles pale brownish; hind angles of ends of ventral segments black. Head as broad across the eyes as long, its apex broadly rounded; cheeks flat, finely and closely rugose, the rugæ enclosing minute punctures; beak reaching middle of hind coxæ. Pronotum with front portion moderately declivent, its sides straight, humeri rounded, disk with numerous fine trans-

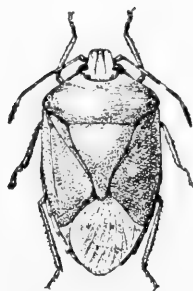


Fig. 33, X 2.
(After Chittenden).

verse rugæ between the punctures. Scutellum with similar rugæ, these more distinct on basal portion, the extreme base with five small pale calloused spots. Elytra alutaceous, finely, evenly and shallowly punctate. Connexivum narrowly exposed. Abdomen with sides finely, rugosely punctate and with a smooth rounded median ridge. Length, 14—19 mm.; width, 8—10 mm. (Fig. 33).

Frequent throughout Indiana, more so in the southern counties, March 14—Oct. 26. Occurs in summer on tall grass and the foliage of various herbs and shrubs along roadsides and fence rows. Most abundant in August and September and probably hibernates, as I have taken it on sunny days in March from the branches of shrubs and in April beneath logs. In Lake and Porter counties it often occurs in the wash-up of Lake Michigan. Dunedin and R. P. Park, Fla., Dec. 15—April 7, three specimens only, all beaten from the borders of wet hammocks. Barber records it from six additional stations and it probably occurs sparingly throughout that State.

The known range of this large and handsome Pentatomid is a wide one, extending from Quebec and New England west through the northern States and southern Canada to the Pacific, and south and southwest to Florida, Texas and Arizona. Uhler (1878, 380) states that it also occurs in "the West Indies and extends as far south as Para, Brazil." He may, however, have confused it with *A. marginatum*, which it closely resembles. Bueno (1908, 166) states that near White Plains, N. Y., in late August he once found both nymphs and adults common on goldenrod along the edges of an old timothy meadow. Morrill (1910, 78) calls it the "green soldier bug," and states that:

"It is the most common Pentatomid found on cotton throughout our southern States, although it is frequently exceeded in abundance by other species. It shows a preference for the cotton bolls, often causing them to fail to open perfectly and produce good lint. This bug is a general feeder and occurs on tomatoes, egg-plant, turnip, mustard, peas, oranges, beans, cabbage, corn, cotton, peaches and okra, often doing much damage by its depredations. At Amherst, Mass., I once found both nymphs and adults on European linden. The trees were fruiting and the bugs were breeding on them in unusually large numbers, feeding almost exclusively on the fruit."

Stoner (1920, 109) says that in Iowa "By far the greater

number of specimens have been taken in August. We have collected them on hazel, wild black cherry and often on wild grape growing along the edges of woods and in more or less shaded and moist situations. On Aug. 24 we once found the nymphs common on basswood trees, and I have in my collection both nymphs and eggs taken on basswood Aug. 15."

110 (180). ACROSTERNUM MARGINATUM (Palisot de Beauvois), 1805, 147.

Close to *hilare*. Slightly smaller and less narrowed behind. Edges of upper surface more reddish; apex of scutellum less produced apically, its tip more broadly rounded. Ventral spine longer and more slender. Paired basal plates of female genitalia with their hind margin concave; in *hilare* broadly obliquely rounded. Male genital plate differing as shown in key. Length, 14—15 mm.; width, 8—8.5 mm.

Cape Sable, Fla., Feb. 23—April 5, two specimens beaten from foliage in dense hammocks (*W. S. B.*). Vera Cruz, Mexico, March 20 (*Osborn*). Although mentioned by Uhler as occurring in Florida, the Cape Sable record is the first one from a definite station. It is a neotropical species recorded so far in the United States only from Florida, Texas, Arizona and California. Van Duzee (1907, 10) wrote of its occurrence in Jamaica as follows: "Abundant everywhere on bushes, especially in the dry hot fields about Kingston. They fairly swarmed on weeds and low bushes along the river bank south of Hope Bay."

This species is very close to *hilare*, but differs especially in the secondary sexual characters. Stal evidently overlooked the differences in the genital plates of both sexes of the two species, as he says of *marginatum* (1872, 42): "*N. hilari* maxime affinis, spina basali ventris nonnihil longiore, staturaque paullo brevior differt."

XX. BANASA Stal, 1860, 24.

Small or medium oval or elongate-oval species having the sides subparallel, not dilated behind; head porrect or feebly declivent, scarcely longer than its width across the eyes, its apex rounded; cheeks usually flat, equalling tylus, their margins sinuate in front of eyes; beak usually reaching or surpassing base of second ventral, its first joint slightly shorter than bucculæ, second about as long as third and fourth united; antennæ slender, first joint shorter than head, second about half the length of fifth, 3—5 subequal, the fifth slightly the

longest; pronotum with front portion moderately to strongly declivent, its side margins straight, humeri obtusely rounded; scutellum broad, gradually narrowed from the base, its apex rather broadly rounded; membrane slightly surpassing abdomen, its veins simple; connexivum narrowly or not at all exposed; spine of second ventral short, obtuse. Osteolar canal attenuate, forming a tapering ridge which reaches almost to outer apical angle of its supporting plate.

About 20 species are known, mostly from the tropical regions. Eight of them occur in the United States, six east of the Mississippi. These naturally group themselves in two series or subgenera, as shown under *a* and *aa* of the following key:

KEY TO EASTERN SPECIES OF BANASA.

- a*. Front portion of pronotum strongly declivent, its color pale yellow or pale green, distinctly contrasting with the darker green, purplish- or reddish-brown hue of the posterior portion; hind angles of the ends of ventral segments acute or ending in minute spines.
- b*. Second joint of antennæ not more than half the length of third; incisures at ends of ventral segments without a black spot.
- c*. Basal halves of pronotum and scutellum quite evenly and regularly punctate; genital plate of male very broadly and shallowly concave; cheeks densely rugosely punctate.

111. DIMIDIATA.

- cc*. Basal halves of pronotum and scutellum very unevenly and sparsely punctate, that of the latter in great part smooth; cheeks obliquely strigose, almost impunctate.

112. LENTICULARIS.

- bb*. Second joint of antennæ three-fourths the length of third; incisures at ends of ventral segments with a black spot.

113. CALVA

- aa*. Front portion of pronotum much less declivent, its hue usually concolorous with that of the hind portion; hind angles of the ends of ventral segments obtuse.

- d*. General color above dull greenish-yellow or fuscous; basal angles of scutellum without a large calloused ivory-white spot.

- e*. Second joint of antennæ three-fourths the length of third; incisures at ends of ventral segments with a black spot; punctures of upper surface rather fine, closely and quite regularly placed.

114. SORDIDA.

- ee*. Second joint of antennæ scarcely more than one-half the length of third; incisures of ventral segments without a black spot; punctures of upper surface coarse, very unevenly and sparsely placed.

115. PACKARDI.

- dd*. General color above clear green; basal angles of scutellum each with a large calloused ivory-white spot.

116. EUCHLORA.

111 (182). *BANASA DIMIDIATA* (Say), 1831, 7; I, 318.

Oblong-oval, subdepressed above, convex beneath. Head, apical portion of pronotum and usually the greater part of scutellum and connexivum greenish-yellow or olivaceous; basal portion of pronotum, apical third of scutellum and elytra clear green or reddish-brown, but always darker than the parts first mentioned; antennæ green or reddish-green at base, the last two joints fuscous; under surface greenish-yellow; tibiæ and beak mostly green, tarsi fuscous. Head as broad across the eyes as long; cheeks flat, coarsely and densely confluent punctate; first and second joints of antennæ subequal, each about half the length of third; beak reaching base of second ventral. Pronotum with front portion strongly declivent, its disk finely, sparsely and unevenly punctate; hind portion of pronotum and base of scutellum more coarsely and rugosely punctate. Elytra rather coarsely, evenly and shallowly punctate. Under surface very finely and sparsely punctate, the end of each ventral with its hind angle ending in a minute spine. Genital plate of male broadly and shallowly concave. Length, 8.5—11 mm.; width, 4.8—6 mm.

Frequent in the northern half of Indiana, May 21—July 21; not taken in the southern counties. Occurs mainly on foliage of hazel, chokeberry and other shrubs along the margins of swales and tamarack swamps. Ranges from Quebec and New England west to the Pacific, and south to northern Florida, Oklahoma and Texas. Say's types were taken from Georgia and Florida, and from the latter State it has since been definitely recorded only from Walton and Leon counties, near the northern border. But little has been written concerning its habits. Van Duzee states that about Buffalo, N. Y., it is "rare in August and September on birch and other trees." Stoner reports it as rare in Iowa "in woodland on deciduous trees." It is nowhere reported as common or injurious. In color it varies exceedingly, but as in *lenticularis* and *calva*, the front half of pronotum is always paler than the hind one. In two specimens from Vermilion Co., Ind., the entire upper surface, except head, front of pronotum and tip of scutellum, is a wine red.

112 (185). *BANASA LENTICULARIS* Uhler, 1894a, 174.

Form and size of *dimidiata*. Color paler, the head, front half of pronotum, basal two-thirds of scutellum and elytra usually dull white, the remainder of upper surface green; antennæ greenish throughout; under surface greenish-yellow, the legs in great part pale green. Structure much as in *dimidiata*, but the sculpture of upper surface very different, the head almost impunctate, but with a few transverse grooves; entire disk of pronotum and scutellum very sparsely and unevenly punc-

tate; elytra much more sparsely and less evenly punctate than there. Length, 9—12 mm.; width, 5—6 mm.

Sanford, Istokpoga, Moore Haven, R. P. Park and Dunedin, Fla., Nov. 27—March 7. Recorded also from Crescent City, Jacksonville, Lakeland and Silver Springs, that State. Described from Grenada and known in the United States only from Florida. About Dunedin it occurs sparingly in late autumn and early spring on huckleberry and other shrubs, especially the tall Ericad, *Xolisma ferruginca* (Walt.), while at R. P. Park it was common in December on foliage along the pathways of the dense hammock on Paradise Key.

113 (184). *BANASA CALVA* (Say), 1831, 7; I, 318.

Form of *dimidiata*, but slightly larger and a little more narrowed from the humeri backward. Color paler, the green more tinged with yellow, but the pronotum with the same contrasting hues between the front and hind portions; antennæ with joints 4 and 5 reddish, the others greenish-yellow, the second about three-fourths the length of third; connexivum and apex of scutellum grayish-yellow; under surface and legs pale greenish-yellow, the abdomen sprinkled with reddish dots, its sides often with vague fuscous blotches. Head slightly longer than wide, feebly narrowed toward apex, both cheeks and tylus finely and very sparsely punctate, beak reaching middle of second ventral. Pronotum with front portion strongly declivent, its disk finely, very sparsely and unevenly punctate; humeri obtusely rounded; disk of hind portion and that of scutellum finely and more evenly but sparsely punctate. Elytra more closely and regularly punctate, the corium with a few small caloused smooth areas. Abdomen almost smooth; thoracic pleura rather coarsely and sparsely punctate. Genital plate of male with hind margin deflexed, widely and deeply emarginate. Length, 11.5—12 mm.; width, 6 mm.

Hamburg, N. Y., Sept. 27 (*Van Duzee*). Grand Tower, Ill., July 12 (*Hart*). Not as yet noted in Indiana. Ranges from Ontario and New England west to British Columbia and Oregon and south to North Carolina and Georgia. The larger size, with head more narrowed in front, longer second antennal joint and black points on ventral incisures are the principal characters separating this species from *dimidiata*, to which it is closely related. Fresh specimens are among the most brilliant of our eastern Pentatomids, the greenish or yellow of the head and front of pronotum contrasting strongly with the vinous-red of the hind portion and the scutellum. Say's types were from Virginia, and were taken on holly, while the types of

Rhaphigaster catinus Dallas, a synonym, were from "Canada." Van Duzee (1904, 59) states that about Buffalo, N. Y., it is "tolerably abundant on various deciduous trees from August to October." The notes on its distribution show that it is much less common than *dimidiata*.

114 (186). *BANASA SORDIDA* (Uhler), 1871, 98.

Oval, subconvex. Above dull yellow, so thickly and evenly marked with dark punctures as to appear almost fuscous; antennæ greenish-yellow, the outer two joints darker; narrow edges of side margins of pronotum, connexivum, basal third of elytra and tip of scutellum, pale yellow; membrane fuscous at base, paler toward apex; connexivum pale brown, its incisures blackish; under surface dull yellow sprinkled with reddish punctures and dots; abdomen with four rows of large vague ill defined blotches, and a dot on the end of each ventral incisure, fuscous; legs dull yellow to greenish-fuscous. Head as wide across the eyes as long, thickly and rather finely punctate, its front gradually feebly narrowed; cheeks equalling tylus; beak reaching middle of third ventral. Pronotum with front half moderately declivent, humeri obtusely rounded; disk with numerous smooth, irregular transverse yellowish lines between the wavy lines of punctures. Scutellum with similar lines between the rows of punctures, a small spot on each basal angle and the tip smooth. Elytra evenly and rather coarsely punctate. Abdomen very finely, sparsely punctate; thoracic pleura more coarsely and closely so. Genital plate of male with hind margin broadly and rather deeply concave. Length, 10—11.5 mm.; width, 6—7.5 mm.

Grand Tower, Ill., June 30—July 10 (*Urbana collection*); Washington, D. C., Oct. 20 (*Osborn*). Not as yet known from, though probably occurs in, Indiana. Ranges from New England to Vancouver's Island and California, south to Maryland and Virginia. Nothing regarding its habits has been recorded.³⁷

115 (187). *BANASA PACKARDI* Stal, 1872, 43.

Elongate-oval, subdepressed. Above dull greenish-yellow or pale reddish-brown, very sparsely and irregularly marked with large blackish punctures; antennæ greenish at base, the outer joints reddish; basal third of pronotum sometimes dark green; tip of scutellum green or yellow; elytra often tinged with reddish; membrane dusky brown, its basal angles fuscous; abdomen greenish-yellow, reddish or fuscous with three rows of large paler yellow spots; legs greenish-yellow; claws and tip of beak black. Head slightly longer than wide, feebly tapering, its apex rounded; cheeks rather coarsely and very sparsely punctate; second joint of antennæ scarcely half the length of third; beak reaching base of

³⁷Parshley, in his keys (1915, 176, and 1923, 768), states that the posterior lateral angles of abdominal segments of *sordida* are acuminate and those of *dimidiata* and *calva* obtuse, whereas the reverse is the case. He also erroneously states that in *dimidiata* the margins of the ventral segments have conspicuous black dots.

third ventral. Pronotum with front portion gradually declivent; disk very sparsely, coarsely and unevenly punctate and with a vague wide shallow depression behind the front angles. Scutellum similarly punctate, the apex smooth. Corium with punctures in part aggregated to form an oblique dark space near middle and another near tip. Under surface sparsely and finely punctate, the thoracic pleura more coarsely so. Length, 10.5—11.5 mm.; width, 5.5—6 mm.

Dunedin, Fla., Dec. 30—March 9, three specimens taken from red cedar, *Juniperus virginiana* Linn.; another Sept. 1, at porch light. Beaufort, N. Car., September (*Brimley*). The only other Florida record is that of Van Duzee (1904, 61) from St. Augustine. Stal's types were from North Carolina, and it is known elsewhere only from New Jersey and Georgia. The only mention of its habits is that of Bueno and Engelhardt (1910, 148) as follows:

"This species was observed only on Smith's Island, N. Car., Aug. 3, and only on one cedar tree. Close inspection showed this tree to be literally covered with insects clinging to the twigs and smaller branches, many in copulation. In spite of the great numbers they were rather inconspicuous, their color and markings, especially those of the abdomen, bearing a striking resemblance to the small cedar twigs. On the slightest disturbance they dropped, taking to wing, however, before reaching the ground. A small vial, holding about 50 specimens, was filled from a single twig. A vigorous kick at the trunk dislodged so many as to obscure the air, but after a short flight all returned and alighted again. As no injury whatever could be detected to the tree, which was a splendid specimen, and in the absence of other insects, which might have been the attraction, the visitation evidently was not due to feeding, but more probably a gregarious habit while mating. This conclusion was strengthened by further observations, including the examination of many cedars, as well as other trees, which failed to reveal the presence of the bug elsewhere on the island."

116 (188). *BANASA EUCHLORA* Stal, 1872, 44.

Elongate-oval, subdepressed. Above clear dark green, two stripes on occiput and scattered spots on front portion of pronotum and disk of corium, yellowish-white and subcalloused; scutellum with tip and a large smooth spot on each basal angle ivory-white; antennæ green, the last two joints tinged with fuscous, the second three-fourths the length of third; connexivum green, the middle of each segment yellow; membrane hyaline, sometimes in part dusky; under surface green with five rows of vague, ill defined yellow or whitish spots; legs green, the tarsi and tip of beak fuscous. Head slightly longer than broad, feebly narrowed in front, its apex rounded; cheeks equalling tylus, subconvex and closely striate-punctate above; beak reaching base of third ventral. Pronotum with front portion moderately declivent, its side margins

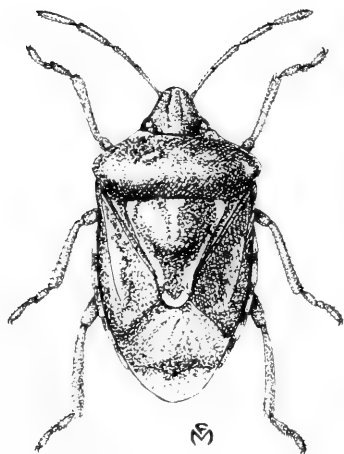


Fig. 34. X 4. (Original).

faintly but evidently concave, its disk and that of scutellum sparsely, coarsely and unevenly punctate. Elytra, except on the calloused spots, finely and rather evenly punctate. Abdomen very finely and sparsely punctate; thoracic pleura more coarsely and closely so. Genital plate of male with a broad crescentic emargination, the tips of the lobes broadly rounded. Length, 9—11 mm.; width, 6—6.5 mm. (Fig. 34).

Putnam Co., Ind., Oct. 1; one adult and one nymph on cedar. Dunedin, Fla., Nov. 28, five adults, three nymphs, also on cedar. This is the first definite station record for Florida. Southern Pines, N.

Car.; Mobile, Ala., April 5, and Nogales, Ariz., Aug. 19 (*Gerhard*). Denver, Colo., June 20 (*Osborn*). Ranges from Maryland and Virginia west to southern Illinois, Iowa and Colorado, and south to Florida, Texas and Arizona. It seems to occur mainly on cedar, as Uhler (1876, 291) states that near Waco, Tex., it was found beneath the bark of cedar trees, and Hart (1919, 182) says that specimens taken at Summerfield, Ill., were from the same plant.

XXI. PIEZODORUS Fieber, 1861, 78.

Species of medium size, resembling closely in form, structure and general appearance those of *Banasa*, but differing in having joints 2—5 of antennæ subequal; osteolar canal shorter, scarcely passing middle of metasternal plate, tapering to a point, not extended as a ridge; spine of second ventral longer, more slender, reaching or slightly passing middle coxæ and often overlapping the tip of beak.

About half a dozen species are known, principally from the tropical regions, two of which occur in our territory.

KEY TO EASTERN SPECIES OF PIEZODORUS.

- a.* Connexivum in great part pale; pronotum with a smooth pale band between the humeri, this separating the paler hue of the front portion from the darker one behind. 117. GULDINII.
- aa.* Connexivum deep black, edged without by yellow or reddish; pronotum without a pale band between the humeri. 118. LITURATUS.

117 (190). *PIEZODORUS GULDINII* (Westwood), 1837, 31.

Elongate-oval, subconvex. Above uniform pale greenish-yellow, fading to dull yellow, the hind portion of pronotum, when fresh, usually purplish-red or brownish; antennæ yellow, the last two joints tinged with reddish; tip of clavus with a small fuscous point; under surface and legs dull greenish-yellow, spiracles black. Head short, wider across the eyes than long, its apex broadly rounded; cheeks flat, equalling tylus, finely, closely, confluent punctate; beak slightly passing middle coxæ. Pronotum with front portion strongly declivent, side margins straight, humeri obtusely rounded; disk finely, unevenly, sparsely punctate. Scutellum rather short, broad, evenly tapering from the base, its disk finely, evenly, not closely punctate. Elytra similarly punctate; connexivum more finely and closely so. Thoracic pleura coarsely, rugosely punctate; abdomen more finely, aciculate-punctate, its middle almost smooth. Genital plate of male convex at middle, depressed each side, its hind margin rounded, with a broad, very shallow concavity at middle. Length, 9.5—11.5 mm.; width, 5—6 mm.

Ormond, Lakeland, Dunedin and Sarasota, Fla., Nov. 19—April 15 (*W. S. B.*). Punta Gorda, Fla., Nov. 11 (*Davis*). Barber lists three additional stations and it probably occurs sparingly throughout the State. It is a neotropical species, recorded in this country only from Georgia, Florida and New Mexico. About Dunedin it occurs frequently in late autumn and early spring on tall weeds and low shrubs along the borders of orange groves and in open pine woods. When fully colored it is a very handsome insect, resembling *Banasa calva* closely in size, form and hue. One specimen from Dunedin has the side margins of pronotum, connexivum and basal half of corium narrowly edged with carmine-red. Cabinet specimens soon fade to a nearly uniform dull yellow. Van Duzee (1907, 10) states that in Jamaica he "swept numbers of this insect from rank weeds along the roadsides. All of them have the base of pronotum blackish, bordered before by a pale calloused band. In none is the rufous band more than indicated."

118 (191). *PIEZODORUS LITURATUS* (Fabricius), 1794, 114.

Form of *guldinii* but averaging larger. Above dark greenish-yellow the basal portion of pronotum, margins of apical third of scutellum and inner field of elytra purplish-red shading to chestnut-brown; tergum black, the edge of connexivum red or yellow; under surface dull greenish-yellow; legs of the same hue, the apical halves of the femora shading to piceous; abdomen often with an oblique dark stripe each side near middle of second and third ventrals. Head much as in *guldinii*. Pronotum less declivent in front, with disk more coarsely, evenly and closely punctate.

tate. Sculpture and structure otherwise as in *guldinii*. Length, 11.5—12.5 mm.; width, 6—6.5 mm.

Ormond, Fla., April 15 (*W. S. B.*). A European species known in this country only from Florida, Van Duzee (1904, 61) having recorded it from Jacksonville. The single female at hand has the entire hind portion of pronotum a deep purplish-red and the edge of connexivum of the same hue instead of the usual pale yellow.

XXII. ARVELIUS Spinola, 1840, 344.

Rather large, elongate-oval, convex species having the head feebly declivent, longer than wide; cheeks narrow, much longer than tylus, acutely pointed, their outer margins straight and inflexed, the inner one thickened, thus forming a median groove; beak slender, reaching base of fourth ventral, its second and third joints subequal, fourth shorter; antennæ slender, joints 3—5 subequal, second slightly shorter; pronotum short and wide, its front half strongly declivent, side margins crenate, broadly concave, humeri ending in a pair of very prominent, upward and outward projecting spines; scutellum strongly tapering, its tip narrowly rounded; membrane reaching tip of abdomen, its veins numerous, simple; connexivum narrowly exposed; mesosternum with a prominent median carina, this prolonged forward between the front coxæ and backward between the hind ones, where it is notched at the end to receive the tip of the prominent ventral spine; abdomen with a rounded median keel; ventral segments with hind angles acute, those of sixth prolonged as spines; osteolar opening with auricle prominent, more than half the length of the tube.

One neotropical species occurs along the southern border of the United States.

119 (192). ARVELIUS ALBOPUNCTATUS (De Geer), 1773, 331.

Dull greenish-yellow, marked above with a few large, very widely scattered metallic blue or green punctures; cheeks edged with black; pronotum often with an irregular yellowish-white band between the bases of the humeri; elytra with a number of small calloused ivory-white spots; spines of pronotum and tip of scutellum yellow; under surface and legs greenish-yellow; middle of abdomen pale yellow; marginal ventral incisures with a black point. Disk of cheeks with very fine transverse wrinkles. Pronotum alutaceous and with numerous minute scattered punctures in addition to the large blue ones, the latter in great part aggregated near the front angles. Scutellum and elytra more coarsely,

somewhat rugosely punctate. Other structural characters as above given. Length, 14—16 mm.; width, 9—10 mm.

One taken at Miami, Fla., March 11, while beating vines on margin of the Brickell hammock; another adult and nymph at R. P. Park, April 8, by sweeping herbage along a ditch (*W. S. B.*). Key West, Fla., Sept. 17 (*Davis*). Recorded also from Crescent City, Biscayne Bay and Miami, Fla., and known in the United States outside of Florida only from Texas, Arizona and California. Occurs in Mexico and South and Central America. A large, handsome and easily recognized species.

XXIII. NEOPHARNUS Van Duzee, 1910, 73.

Medium sized species having the cheeks broad, deeply sinuate in front of eyes, their tips rounded, approaching and almost contiguous at apex above and beyond the tip of the narrow tylus; beak reaching apex of third ventral; front of pronotum quite strongly declivent, its side margins eroded and armed with four or five filamentous teeth, those at front angles reaching to front of eyes; humeri produced in an outwardly projecting rounded subnodular lobe; scutellum uneven and swollen at base, the apex with a thickened submargin and short median carina; connexivum broadly exposed, the apical angles of the segments produced; abdomen with a broad, flat carina in a wide shallow depression; tibiæ sulcate; osteolar opening with a straight abruptly ending canal reaching to middle of metasternal plate. One species is known.

120 (193). NEOPHARNUS FIMBRIATUS Van Duzee, 1910, 73.

Broadly oval, punctate and hairy. Obscure fulvo-testaceous tinged with ferruginous on the base of scutellum and humeral angles. Whole surface punctured with fuscous, the punctures becoming black in places, especially on middle of pronotum anteriorly, scutellum and costal area of corium. Under surface with a line beneath the base of each antenna, a dot before the eye, a few dots and lines on the thoracic pleura and the incisures at the margins, black. Abdomen with sides strongly punctured with black, the disk smooth; legs annulate with fuscous. Length, 12 mm.; width, 8 mm.

The above comprises the salient features of the original generic and specific characterizations of Van Duzee. The unique type is a female taken in "Florida" by Bueno and now in the Van Duzee collection. Of it he says: "This insect has much the aspect of a small *Brochymena*, but in its generic char-

acters it agrees entirely with *Pharnus* except for the produced contiguous cheeks, fimbriate margins of pronotum and produced nodular humeri."

XXIV. DENDROCORIS Bergroth, 1891, 228.

Small, broadly oval Pentatomids having the head porrect, its apex rounded; cheeks broad, longer than tylus and usually meeting in front of it, their margins sinuate in front of eyes; beak very slender, reaching hind coxæ, its second joint longer than third, fourth shortest; antennæ slender, the third joint the longest; pronotum short and wide, its front half moderately declivent, the side margins more or less concave; humeri prominent, somewhat flattened and projecting, their tips obtusely angled; scutellum short, broad, the sides sinuate at apical third, the tip rounded; connexivum widely exposed; membrane equalling or slightly surpassing tip of abdomen, the veins usually simple; tibiæ sulcate above; spine at middle of second ventral stout, reaching hind coxæ; osteolar canal long, attenuate, reaching beyond middle of metasternal plate.

Seven species are known, all from the United States, but only two occur in our territory. The generic name in use up to 1891 was *Liotropis* Uhler (1877, 399). This was shown by Bergroth (loc. cit.) to be preoccupied. In both our eastern species the genital plate of male has a deep, U-shaped emargination, the middle of base of which bears an oblong lobe, this also with an acute V-shaped median notch; while the basal plates of the female genitalia are concealed beneath the sixth ventral.

KEY TO EASTERN SPECIES OF DENDROCORIS.

- a. Head longer than its width across the eyes; second joint of antennæ only about one-fourth the length of third; side margins of pronotum strongly concave; spiracles pale. 121. HUMERALIS.
- aa. Head wider across the eyes than long; second joint of antennæ three-fourths as long as third; side margins of pronotum broadly feebly concave; spiracles black. 122. FRUTICICOLA.

121 (194). DENDROCORIS HUMERALIS (Uhler), 1877, 400.

Broadly oval, subdepressed. Above dull clay-yellow thickly marked with small, deep reddish punctures, the impunctured areas often appearing on pronotum and scutellum as small subcalloused pale spots; antennæ greenish-yellow, the outer joints reddish-fuscous; connexivum orange-yellow with a black point at each incisure; under surface dull yellow

thickly sprinkled with reddish dots and punctures; hind angle of the end of each ventral black; legs dull yellow, the tibiæ in part and tarsi reddish. Cheeks feebly concave, usually contiguous above and in front of tylus, sometimes not meeting, the apex of head then appearing slightly cleft, their disks evenly, finely, closely and deeply punctate. Antennæ moderately stout, the third joint nearly one-half longer than first and second united; fourth slightly shorter than fifth. Pronotum as described above, its disk and that of scutellum rather evenly punctate, with numerous smooth areas intervening. Elytra more finely and sparsely, less deeply punctate. Abdomen very finely, sparsely and shallowly punctate; thoracic pleura more coarsely and deeply so. Length, 6.5—7.5 mm.; width, 4.5—5 mm.

Marion, Knox and Posey counties, Ind., April 21—Aug. 3; probably occurs sparingly throughout the State. Ranges from New England west to Kansas and Colorado and south to Georgia. Occurs mostly on the foliage of oak or hickory in dry upland or sandy localities. Uhler (1877, 401) in his notes following the original description, says: "This beautiful little species resembles the genus *Euschistus* in that part of the group represented by *E. tristigma* Say. . . . As it roams so widely, and over a multitude of plants and trees, we believe it to be carnivorous like its brethren of the genus *Podisus*." Kirkland (1897, 57) states that this supposition of Uhler was correct as in Massachusetts it has been repeatedly found destroying tent caterpillars, and, on several occasions, the gypsy moth larvæ. Van Duzee (1904, 62) records the beating of it from scrub oak on the mountain sides in Colorado, while Hart states that in Illinois it is not uncommonly swept from black-jack oak.

Although Uhler, in his original description, states that the pronotum of *humeralis* has "anteriorly each side of middle a round black spot," but one of the Indiana specimens at hand shows a trace of these spots and in that one they are very faint. Another example has the hind portion of pronotum almost covered with two large bilobed fuscous blotches. The small round black spots are very evident in all specimens of the next species.

122 (195). *DENDROCORIS FRUTICICOLA* Bergroth, 1891, 228.

Form and size of *humeralis*. General color much as there, the punctures of upper surface fuscous, fewer in number, more shallow and less evenly placed; pronotum with a pair of round, submedian black dots at basal third; side margins of scutellum each with a similar slightly larger one at apical third; corium with apical half often tinged with

reddish; connexivum orange-yellow with a round black spot on the inner end of each incisure and a black point on the outer end; under surface pale dull yellow, spiracles and the hind angle of each ventral black; legs yellow, the tibiæ and tarsi reddish. Head distinctly shorter and broader than in *humeralis*, its apex more broadly rounded, the cheeks overlapping in front of tylus; second joint of antennæ two-thirds or more the length of third, the latter subequal to fourth, the fifth one-third shorter. Pronotum with disk rather sparsely, unevenly punctate. Scutellum similarly punctate, its apical third wider than in *humeralis*, the tip much more broadly rounded. Elytra minutely alutaceous, finely, evenly, not closely punctate. Sculpture of under surface as in *humeralis*. Length, 6.5–8.5 mm.; width, 4.5–6 mm.

Ormond, Sanford and Dunedin, Fla., Feb. 25—April 24. Van Duzee and Barber have recorded it from numerous other stations and it doubtless occurs throughout the eastern and southern portions of the State. About Dunedin it is common in spring in both nymph and adult stages on oak sprouts, huckleberry and other low shrubs. It is a trim-bodied and prettily marked little bug, easily distinguished from *humeralis* by the characters given in key. At Ft. Myers and Estero, Van Duzee (1909, 158) found it "abundant with its young on the scrub oaks which grew wherever the pine forests had been cut away." Outside of Florida it has been recorded definitely only from Wilmington, N. Car., where Engelhardt found it, Aug. 1, on young oaks. The New Mexico record of Uhler (1904, 351) belongs to a species since described by Barber as *D. reticulatus*.

XXV. BREPHOLOXA Van Duzee, 1904, 78.

Medium sized, elongate-oval species having the head porrect, longer than wide; cheeks exceeding tylus, approaching or contiguous in front of it; antennæ slender, the second joint one-half longer than third, the latter subequal to fourth, the fifth slightly shorter; bucculæ with a prominent tooth at their apical third; beak surpassing middle coxæ, its second and third joints subequal, fourth shorter; pronotum with front half moderately declivent, side margins almost straight, finely crenulate, humeri acutely pointed; scutellum with sides feebly sinuate near middle, beyond that strongly tapering, the tip narrowly rounded; membrane hyaline, not surpassing abdomen; connexivum rather broadly exposed; spine of second ventral reaching hind coxæ; osteolar opening with a short, obtusely pointed auricle; tibiæ not sulcate. Genital plate of male convex at

middle, its sides concave; hind margin with a small, U-shaped median notch. One species is known.

123 (201). BREPHOLOXA HEIDEMANNI Van Duzee, 1904, 78.

Elongate-oval, subdepressed. Above and beneath a uniform pale dull yellow; narrow edges of head and pronotum and apical joints of antennæ tinged with reddish. Head, pronotum and scutellum finely, rather closely punctate, with numerous narrow, wavy, transverse rugæ between the rows of punctures. Elytra more sparsely punctate, the rugæ less evident. Structural characters as above given. Length, 11—12 mm.; width, 6—7 mm.

Cape Sable and Sanibel Island, Fla., Feb. 23—March 4 (H. S. B.). Beaten in small numbers from foliage of the black-mangrove and other shrubs along the margins of brackish-water bayous. The types were from Biscayne, Fla., and it has not been recorded elsewhere. Superficially it bears a close resemblance to both *Piezodorus guildinii* and faded examples of *Banasa calva*, but is easily separated by the characters given in the generic key.

Tribe IV. EDESSINI.

This tribe, as characterized in the key, p. 94, contains only the single genus:

I. EDESSA Fabricius, 1803, 145.

Large, broadly oval, robust species having the head short, porrect, broader across the eyes than long; cheeks longer than tylus, and meeting in front of it; beak short, not reaching middle coxæ, its tip normally received in front notch of metasternal crest, its first joint longer than bucculæ, second as long as third and fourth united; antennæ not reaching base of pronotum, first joint passing apex of head, 2 and 3 subequal, 4 and 5 also subequal and longer; pronotum with front portion strongly declivent, side margins straight, entire, humeri obtusely rounded; scutellum relatively short and broad, its tip broadly rounded; membrane not surpassing abdomen, its veins numerous, simple, oblique; connexivum broadly exposed, the abdomen therefore widest behind the middle; metasternum with the peculiar ridge described in key, this deeply notched at each end and with a median lobe each side between the middle and hind coxæ (fig. 35, *a*); second ventral with a short, triangular spine, whose apex is received in hind notch of metasternum.

nal ridge; osteolar canal tapering into a long curved ridge. Hind margin of genital plate of male with a broad median U-shaped notch.

Stal (1872, 49) lists no fewer than 115 described species of this genus, all from tropical Central and South America and Mexico, and many of them doubtless synonyms, as only 68 of them were known to him and separated by his keys. Of these but one occurs in the United States and our territory.

124 (202). *EDESSA BIFIDA* (Say), 1831a, 7; I, 303, 322.

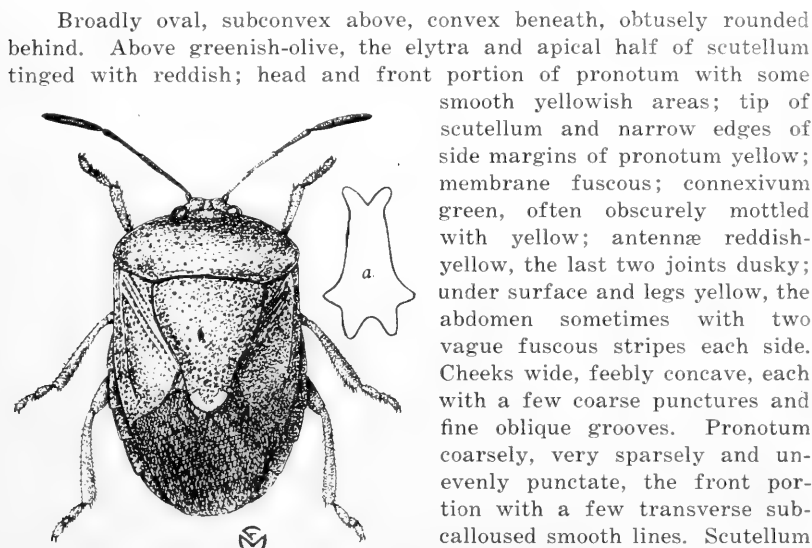


Fig. 35, X 3. *a*, median ridge of metasternum. (Original).

third, the yellow tip smooth. Elytra minutely alutaceous, finely, evenly and rather closely punctate. Under surface rather coarsely and very sparsely punctate, the low median lengthwise ridge of abdomen smooth. Length, 13–15 mm.; width, 7–8.5 mm. (Fig. 35).

Dunedin, Sanford, Moore Haven, Ft. Myers, R. P. Park and Cape Sable, Fla., Dec. 12—April 4; Orizaba, Mexico, July 28 (H. S. B.). Recorded by Van Duzee and Barber from a dozen or more additional localities in Florida and doubtless occurs sparingly throughout that State. Known elsewhere in the United States only from Louisiana and Texas, Say's types being from the former State. My specimens were mostly taken by sweeping low shrubs along the margins of ditches and streams; the two from Dunedin on grasses of tidewater marshes. Uhler

(1894, 176) states that it is "distributed from northern Brazil through Central America and Mexico into the southern United States and the Antilles. It is variable to a marked degree in the distribution, depth and coarseness of the punctures, the length of body and the convexity of pronotum. When alive the color is grass-green above with the corium more or less bright wine-brown."

Subfamily II. ASOPINÆ Spinola, 1850, 29.

Pentatomids varying much in form, size and general appearance, but all agreeing in having the head porrect or nearly so; cheeks rarely (*Rhacognathus*) much longer than tylus; beak stout, passing middle coxæ, its front joint thick, broad and deeply grooved, much longer than bucculæ, its base contiguous to end of tylus (fig. 18, *b*); bucculæ very short, converging or meeting behind and beneath the basal joint of beak; front tibiæ with a short spine near middle of inner side; tarsi 3-jointed.

The subfamily is represented in the United States and Canada by 11 genera and about 30 species. Of these ten of the genera and 22 species are known from our territory. The majority of these are predatory upon plant lice, caterpillars and other soft-bodied injurious insects, and are therefore of considerable economic value.

KEY TO EASTERN GENERA OF ASOPINÆ.

- a.* Front femora armed beneath at apical third or fourth with a short spine or acute tubercle; ventrals 4—6 of males (except in *Alcæor rhynchus*) with a large oblong silky pubescent spot each side of middle.
- b.* Scutellum broad, U-shaped, its tip twice or more the width of corium, frena about one-fourth its length. I. STIRETRUS, p. 179.
- bb.* Scutellum much narrower, its tip at most scarcely wider than corium, frena one-half or more its length.
- c.* Humeral angles of pronotum ending in a prominent upward and outward projecting spine, males without pubescent spot near middle of ventrals 4—6; larger, length 18 or more mm.
II. ALCÆORRHYNCHUS, p. 183.
- cc.* Humeral angles obtusely rounded; males with pubescent spot on ventrals; smaller, not over 14 mm.
- d.* Spine of second ventral reaching middle coxæ.
III. OPLOMUS, p. 184.
- dd.* Spine of second ventral scarcely reaching hind coxæ.
IV. PERILLUS, p. 185.

aa. Front femora without spine or tubercle; males (except in *Mineus*) without pubescent patch on ventrals 4—6.

e. Cheeks much longer than tylus and meeting in front of it; osteolar canal very short. V. RHACOGNATHUS, p. 189.

ee. Cheeks not or very slightly longer than tylus; osteolar canal long, curved, tapering.

f. Beak reaching middle of second ventral, its second joint more than twice as long as third; humeri with an oblong subtruncate projection; color blue or green with red markings.

VI. EUTHYRHYNCHUS, p. 189.

ff. Beak not passing hind coxæ, its second joint less than one-half longer than third; humeral projection, if present, acute or spinose.

g. Second ventral with a distinct slender median spine projecting forward to or between the hind coxæ; color not blue.

h. Fourth joint of beak about twice as long as third; side margins of pronotum entire; colors black and orange.

VII. MINEUS, p. 191.

hh. Fourth joint of beak subequal to third; side margins of pronotum crenate or suberrate; color grayish or brownish yellow.

i. Larger, length, 14 or more mm.; cheeks slightly longer than tylus; female genital segment usually with three basal plates. VIII. APATETICUS, p. 192.

ii. Smaller, not over 12 mm.; cheeks equalling tylus; female genital segment with but two basal plates.

IX. PODISUS, p. 195.

gg. Second ventral unarmed; color dark metallic blue.

X. ZICRONA, p. 202.

I. STIRETRUS Laporte, 1832, 75.

Medium sized, oval, convex species having the head porrect, about as broad as long, its apex subtruncate; cheeks wide, flat, equalling tylus, their tips rounded; beak slightly surpassing middle coxæ, its first, second and fourth joints subequal, third shorter; pronotum about twice as wide as long, its front portion but slightly declivent; side margins sinuate, entire, humeri obtusely angulate, nodulate above; scutellum as in key; corium much narrower than scutellum, its apex very oblique and sinuate; membrane passing abdomen, its veins numerous, simple; osteolar canal broad, curved, the groove distinct only at base; second ventral with a prominent median spine, reaching almost to middle coxæ; front tibiæ strongly dilated, concave above. Genital plate of male with hind margins semicircular, trisinuate and with a minute median notch.

Stal (1870, 22) lists 25 species, mostly from tropical

America; some of these, however, are mere color varieties. Two species occur in the eastern states.

KEY TO EASTERN SPECIES OF STIRETRUS.

- a*. Color black and red or black and orange-yellow, sometimes a uniform blue; length, 10.5 or more mm. 125. ANCHORAGO.
aa. Color brown-bronzed and dull yellow, without trace of black, red, orange or blue; length, not more than 10 mm. 126. FIMBRIATUS.
- 125 (207). STIRETRUS ANCHORAGO (Fabricius), 1781, 341.

Broadly oval, convex above and beneath. Above blue-black, shining; front and side margins of pronotum as far as the humeri, and sometimes the posterior side margins, broadly edged with orange; scutellum with a broad basal spot, angulate at sides, usually a narrow median line and



Fig. 36. X 4. (After Lugger).

the extreme apex, red or orange-yellow; antennæ blue-black, the incisures paler; connexivum with segments blue-black at each end, the middle red or orange; under surface blue-black; sides of abdomen red or orange with a row of round spots, and also a large triangular one on the end of each incisure, blue-black; middle of second and third ventrals and the ventral spine orange or red; front and side margins of the prothoracic pleurites and often a small spot or two on each of the others, reddish or orange. Head coarsely and confluent punctate, the occiput smoother; antennæ with joints 2, 4 and 5 subequal, 3 one-third shorter. Pronotum with front portion in great part smooth, the coarse punctures very unevenly placed; hind portion more evenly and coarsely punctate, its side margins concave, their inner angle acute. Scutellum with basal pale portion very sparsely and coarsely punctate, the apical half more closely and quite evenly so. Elytra finely, evenly, shallowly punctate. Abdomen rather finely, evenly not closely punctate; thoracic pleura coarsely, sparsely and deeply so. Other structural characters as above given. Length, 10—11.5 mm.; width, 6—7 mm. (Fig. 36).

Ormond, Bassenger, Istokpoga, R. P. Park, Sarasota and Dunedin, Fla., Nov. 21—April 4. About Dunedin it occurs sparingly in late fall and early spring on flowers of thistle and *Xolisma* and the foliage of other plants along the margins of hammocks and swales. Van Duzee records it from Crescent City and Ft. Myers, and Barber from Lakeland and the Indian River District. It is a very striking insect, variable in the ex-

tent of its orange or red markings, the median narrow line of scutellum being often absent.

The typical form of *anchorago* as described above has been often referred to by American authors as var. *pulchellus* Westwood (1837, 42), but I can find no definite mention of its occurrence in the States north of Florida. However, two color varieties besides the typical form occur in our territory and may be separated as follows:

KEY TO VARIETIES OF STIRETRUS ANCHORAGO (FABR.).

- a. Color above black and red or black and orange, not uniform blue.
- b. Pronotum black, with front and side margins broadly red or orange. 125. typical ANCHORAGO.
- bb. Pronotum red, with front margin, a broad median stripe and two spots each side, steel-blue or black. 125a. var. PERSONATUS.
- aa. Color above a uniform dark blue. 125b. var. VIOLACEUS.

125a (207c). STIRETRUS ANCHORAGO PERSONATUS (Germar), 1839, 16.

This variety is very close to typical *anchorago*, from which it differs mainly by the characters given in key and by having an irregular transverse dark spot on the middle of the pale basal one of scutellum.

Mobile, Ala., Aug. 23 (*Barber*). Described from Mexico. Uhler (1878, 369) records it from Pennsylvania.

125b (207d). STIRETRUS ANCHORAGO VIOLACEUS (Say), 1828, iii; I, 94.

Uniform dark violet-blue above and beneath; a median spot on second and third ventrals and the ventral spine yellow; antennæ fuscous with a bluish tinge; beak and tarsi brown. Length, 11 mm.; width, 7 mm.

Ormond and Dunedin, Fla., April 4—17. Say's type was from St. John's River, Fla., and Barber records it from seven additional stations, between St. Augustine and Lake Okeechobee, that State. Van Duzee (1909, 158) says that one of two specimens taken by him at Sanford "was of a deep violet-black color; the other was tinged with steel-blue and green." This variety is mainly southern in distribution, though Uhler (1876, 281) says that it has been taken once near Philadelphia; also in Georgia and Texas.

126 (207a). STIRETRUS FIMBRIATUS (Say), 1828, iii; I, 93.

Differs from *anchorago* mainly in size and in the color and sculpture of the upper surface. Head reddish-brown; pronotum dull yellow with a wide median reddish-brown stripe extending from apex to base, this with a projection each side in front of middle; also with three brown spots each side on basal half. Scutellum yellow with a



Fig. 37, X $2\frac{1}{2}$.
(After Lugger).

large, irregular brown spot, furcate behind, reaching from base to apical fourth; elytra yellow with a brown spot of varying size on corium; membrane fuscous, the tip paler; under surface bluish-green with yellow markings and dark spots as in *anchorago*; legs and antennæ reddish-brown, the middle and hind femora and tibiæ with yellow markings. All the reddish-brown spots above at times tinged with greenish or faintly bronzed. Pronotum with the coarse punctures confined mainly to the basal half of the median brown stripe and to the dark spots each side, the yellow areas almost smooth. Length, 8—10 mm.; width, 5—6 mm. (Fig. 37).

Putnam, Lawrence, Knox, Crawford and Posey counties, Ind., April 26—July 10. Taken from flowers of wild plum on the former date; beaten from sumac, and mating, June 5. A member of the Austroriparian fauna, but ranging from New England west to Iowa and Kansas and south to Florida and Texas; Barber (1914, 524) recording it from Jacksonville, Charlotte Harbor, Lake Worth, Sanford and Little River, Fla. Say's types were from Pennsylvania. Uhler (1878, 369) states that "in Maryland it frequents the sumac, *Rhus glabra* L., and sucks the blood of the larva of a species of *Galeruca* which feeds on that plant." He probably referred to the Chrysomelid beetle, *Blepharida rhois* Forst., which feeds almost exclusively on sumac. Glover (1876, 68) calls it the "bordered soldier bug," and states that "it preys upon the larvæ of the Colorado potato beetle, *Doryphora 10-lineata* (Say). Seven or eight individuals were found in the web nest of a social caterpillar and also were seen destroying the larvæ of *Papilio asterias* or *Asterias* butterfly."

This species is usually recorded as a variety of *anchorago*, but I have not seen nor can I find mentioned any intermediate form. The punctures of pronotum are fewer and more unevenly placed and the basal third of pronotum more convex, with basal margin next to humeral angles more abrupt and less prolonged. The dark markings on the upper surface, while varying from reddish-brown to greenish-bronzed in hue, are very uniform in size and shape, the peculiar bifurcate one of scutellum being especially notable.

The large and peculiar depressed pubescent spaces on each side of ventrals 4—6 in the males of *Stiretrus* and some of the allied genera are especially noteworthy. Their function has not as yet been satisfactorily determined, though Stal in his

keys calls them "stridulatory spots." They are, of course, analogous to the finely ridged spaces found in the males of a number of Scutellerids, but those are not pubescent, and their ridges might, and doubtless do, serve in making sound by drawing the hind legs across them. In fact, *Stircrus* appears to be more closely allied to the family Scutelleridæ than to the Pentatomidæ. It was placed next to that family by Stal in his "Enumeratio" and Say described the two forms of *Stircrus* above treated as members of the genus *Tetyra*, placing them with the Scutellerid now known as *Eurygaster alternatus*.

II. ALCÆORRHYNCHUS Bergroth, 1891, 235.

Very large elongate-oval species having the head porrect, longer than broad, its apex subtruncate; cheeks as long as tylus, their margins parallel; beak very stout, reaching hind coxæ, second joint slightly longer than fourth, third shorter than either; antennæ short, joints 2, 3 and 5 subequal, 4 longer; pronotum with front portion strongly declivent, its side margins straight, roughly crenulate, humeri ending in a stout very acute spine, this with a short, obtuse submedian lobe behind; scutellum long, strongly tapering behind, the tip narrowly rounded, frena two-thirds its length; apex of corium oblique, feebly angled opposite tip of scutellum; membrane surpassing abdomen, its veins simple; connexivum rather widely exposed, female, narrowly so, male; osteolar opening with a long curved attenuate canal; projection of second ventral a broad flattened tubercle, its tip rounded; tooth of front femora stout, obtuse; tibiæ sulcate above, the front ones deeply so.

Two neotropical species are recorded from Florida. They were formerly classed under *Mutycæ* Stal, a name which was preoccupied.

KEY TO EASTERN SPECIES OF ALCÆORRHYNCHUS.

- a.* Spines of humeri directed straight outward; base of scutellum and elytra sparsely punctured; length, 18—20 mm.

127. PHYMATOPHORA.

- aa.* Spines of humeri in front of their median lobe directed slightly forward; base of scutellum and elytra more closely, rugosely punctured; length, 21—24 mm.

128. GRANDIS.

- 127 (209). ALCÆORRHYNCHUS PHYMATOPHORA (Palisot de Beauvois), 1805, 112.

Elongate-oval, sides of elytra subparallel. Dull clay-yellow, rather sparsely and irregularly beset with fuscous or reddish-brown punctures;

sutures and margins of cheeks, humeral spine and calli of pronotum dark reddish-brown; membrane pale brownish-translucent; legs dull yellow, scattered dots and a ring near apex of femora, and base and apex of tibiæ, dark reddish-brown; apical joint of tarsi blackish; sides of pleura and ventrals with irregular reddish-brown areas. Connexivum of male not exposed. Corium not alutaceous as in *grandis*. Ventrals much more coarsely punctate. Length, 18—20 mm.

“Cuba” (*Van D.*). Described from San Domingo. Taken by Mrs. Slosson at Lake Worth and Biscayne Bay, Fla.

128 (210). *ALCÆORRHYNCHUS GRANDIS* (Dallas), 1851, 91.

Elongate-oval, subdepressed above, convex beneath. Above dull clay yellow, often tinged with reddish, thickly marked with rather coarse fuscous or reddish punctures; narrow edge of head, a narrow, very irregular smooth transverse space on each side of front half of pronotum and the humeral spines, fuscous-brown; antennæ dark brown, the base and tip of fourth and fifth joints pale; connexivum dark brown, each segment paler at middle; membrane brownish-hyaline; under surface dull yellow, flecked with fuscous or reddish dots and punctures; legs reddish-yellow; beak and last joint of tarsi brown. Head with a few scattered coarse punctures. Front portion of pronotum with a small tooth at each apical angle, its disk unevenly sparsely punctate and with numerous small very irregular smooth areas; hind portion and scutellum much more evenly and rather closely and coarsely punctate. Corium minutely alutaceous, its punctures fine, shallow, unevenly placed. Abdomen finely and very sparsely punctate; thoracic pleura very coarsely and rather closely so. Length, 21—24 mm.; width, 12—14 mm.

Ormond, Sanford and Lake Okeechobee, Fla., Jan. 6—April 4. Beaten from shrubs along the banks of streams or marshes. Barber lists it from Lakeland, Archer and Ft. Myers, Fla., and it probably occurs in small numbers throughout the eastern and southern portions of that State. Recorded also from Brownsville, Tex. The types of Dallas were from Colombia, South America, and Mexico.

III. *OPLOMUS* Spinola, 1840, 355.

Medium sized, convex, oval species, differing from *Perillus*, as characterized below, only in having the scutellum slightly but evidently widened behind the middle and the spine of second ventral projected forward to the middle coxæ.

Fifteen species are listed by Stål from Mexico and South America, one of which is recorded by Van Duzee (1917, 72) from Florida.

129 (212). *OPLOMUS TRIPUSTULATUS* (Fabricius), 1803, 172.

Narrowly oval, subconvex. Black, shining; cheeks each with a small median red spot, sometimes wholly reddish-yellow; pronotum with two spots near front margin, three in a transverse row near middle, and often the tips of humeral angles, red or orange-red; scutellum with a spot on each basal angle and another covering the apex, red or yellow; costal margin with a small reddish spot near tip; membrane black, the apical fourth brownish-hyaline; under surface piceous-black, sides of coxæ, spine of second ventral and spot on outer margins of ventrals 2 and 5 reddish. Antennæ black, joint 1 scarcely reaching tip of tylus, 2 more slender, three and a half times as long as 1, 3 and 4 subequal, each slightly shorter than 2, 5 tapering, slightly longer than 4. Head depressed, sparsely irregularly punctate, cheeks concave. Pronotum broadest across humeral angles, narrowed behind them, sides sinuate; disk, as well as that of scutellum, sparsely and unevenly punctate. Front tibiæ of male with apical half flattened, its outer margin much expanded. Length, 11.5—13 mm.

Florida (*Ivan D.*). Bogota, Columbia (*British Mus. Coll.*). A neotropical species of wide distribution and exceedingly variable color. The typical form above described is known in this country only from Florida.

VI. *PERILLUS* Stal, 1862, 88.

Small or medium sized oval species having the head more or less declivent, longer than broad, its apex broadly rounded or subtruncate; cheeks broad, equalling tylus, slightly concave, their margins parallel; beak reaching or slightly surpassing middle coxæ, its second joint almost as long as the next two united, the third shortest; pronotum with front portion moderately to strongly declivent, its side margins straight, entire, humeral angles obtusely rounded; scutellum relatively broad, not widened behind the middle, its tip broadly rounded; apex of corium oblique, feebly sinuate; membrane passing the tip of abdomen; connexivum narrowly or not at all exposed; ventral spine short, obtuse, scarcely reaching hind coxæ; osteolar canal long, curved, its margins broad, flattened; tibiæ sulcate above.

Six species are known, all from Mexico and the United States, three of which occur in our territory.

KEY TO EASTERN SPECIES OF *PERILLUS*.

- a.* Front femora armed with a distinct spine which is longer than wide; transverse dark bar of front half of pronotum interrupted, forming two spots; larger, length, 8.5—11.5 mm.

- b.* Antennæ black, the incisures only pale; abdomen with a submarginal row of black spots.
- c.* Black with red markings; elytra black, the basal half of costal border red. 130. *BIOCULATUS*.
- cc.* Rufous or chestnut-brown, the markings ivory-white, or pale yellow; corium pale, only the inner margin narrowly black. 130a. var. *CLANDA*.
- bb.* Antennæ fuscous, first two joints and basal half of third reddish-yellow; abdomen without rows of dark spots. 131. *CIRCUMCINCTUS*.
- aa.* Front femora armed with only a small tubercle which is not longer than wide; transverse dark bar of pronotum entire; smaller, length, 5—7.5 mm. 132. *EXAPTUS*.
- 130 (216). *PERILLUS BIOCULATUS* (Fabricius), 1775, 715.

Oblong-oval, subconvex above, more strongly so beneath. Above black, shining; front half of pronotum, except a large spot each side of middle, a submarginal stripe on all sides of disk of scutellum, edge of basal half of embolium and margin of connexivum bright orange-red; abdomen red, in female with two submedian rows of small spots, a round spot on each spiracle, a stripe along the middle of each side, and the genital plate, black; in male with a large central black spot embracing the pubescent areas; thoracic pleura black; lower margin of pronotum red; legs black, the middle and hind tibiæ with a pale ring. Head coarsely, closely, confluent punctate. Pronotum with front half strongly declivent, disk coarsely, very sparsely and unevenly punctate. Scutellum sparsely and rather finely punctate, the black margins near base very coarsely so. Elytra and connexivum finely, shallowly, and rather evenly punctate. Abdomen almost smooth, the sides finely rugose; thoracic pleura very coarsely and rather sparsely punctate. Length, 8.5—11.5 mm.; width, 5.5—7 mm.

Lake and Posey counties, Ind., Sept. 12—23. This, the typical *bioculatus*, includes the varieties “*b*” and “*c*” of Say’s *Pentatoma clanda*. As a species it ranges from Ontario and New York west to the Pacific and southwest to Florida, New Mexico and Arizona. Barber (1914, 524) lists it from Florida without definite locality. The majority of the records have been made under the name *P. clanda* (or *clauda*) Say, and it is therefore difficult to give the approximate range of each of the two forms. Hart (1919, 198) records typical *bioculatus* from Algonquin, Ill.; Gerhard (Ms.) from Chicago, Ill., and Pentwater, Mich., April 19—Sept. 6, and Stoner (1920, 119) from Clinton, Ia. It has been seen to prey upon the larvæ of the Colorado potato beetle, but as Stoner well says “it is apparently

not anywhere of sufficient abundance to be of great value in checking the increase of noxious insects."

130a (216a). *PERILLUS BIOCULATUS CLANDA* (Say), 1825, 312; II, 240.

Differs from typical *bioculatus* only in color, the black of that form being replaced by brown or piceous, and the red or orange by ivory-white or yellow. Elytra ivory-white with the narrow inner margin and a median triangular spot black.

Marion Co., Ind., July 21; one swept from herbage on margin of pond. This is the form which has been most frequently recorded from the eastern states, though but few of the later records differentiate the two. Davis has taken it on Staten Island in June.

131 (217). *PERILLUS CIRCUMCINCTUS* Stal, 1862, 89.

Elongate-oval, convex. Above pale chocolate-brown; pronotum with front and side margins, a narrow median line and sometimes a narrow cross bar between the humeri, ivory-white or pale yellow, the front portion with an oblong black or fuscous spot each side of middle; scutellum entirely surrounded by a broad ivory-white marginal stripe, this narrow at base and along basal half bordered each side with very coarse brown punctures; connexivum black, its narrow edge and the entire costal border of elytra, ivory-white; abdomen chocolate-brown, the sides, a spot at middle of second and third ventrals and the ventral spine yellow; thoracic pleura paler brown with yellow markings; legs pale reddish-brown, the tibiæ with a submedian yellow ring. Head much more sparsely punctate than in *bioculatus*, otherwise as there. Pronotum slightly longer and more narrow, with front portion less declivent, the punctures much coarser, sparsely and unevenly placed, the tooth of front angles very short and blunt; hind portion more evenly, but coarsely and very sparsely punctate. Scutellum with basal half coarsely unevenly punctate, the apical portion more finely and evenly so. Elytra finely, shallowly and quite evenly punctate. Abdomen with sides finely, sparsely but distinctly punctate, its middle smooth; thoracic pleura with very coarse sparse punctures. Hind margin of genital plate of male semi-circular, subtruncate, with a small median notch. Length, 9—11 mm.; width, 5—6 mm.

Rock City, N. Y., June 6 (*Davis*). Chicago and Forest City, Ill., April 28—June 6 (*Hart*). Not yet taken in Indiana, though doubtless occurs in the northern portion of the State. Ranges from Ontario and New England to Manitoba, Nebraska and Dakota. Not recorded south of New Jersey, central Illinois and Missouri, though Uhler (1872, 395) says it occurs in "Panama and the Island of Trinidad." About Buffalo, N. Y., Van Duzee (1894, 170) found it on coarse weeds, bushes and trees in July

and August, and hibernating in dead leaves and grass in January. In Illinois, Hart (1919, 198) says: "It seems to occur only in sandy areas. In the Illinois Valley sand region we have found it common on the low sumac of the sands associated with the larvæ of *Blepharida rhois* L. (the sumac beetle), on which it was probably feeding."

This species is very closely allied to *P. bioculatus*, the arrangement of the dark and pale colors above being very similar. Zimmer (1911, 17) says that in a large series from all parts of the country there are numerous intermediates between two extremes, and that "I am inclined to believe that the two so-considered species are but two extremes of an exceedingly variable form." In the specimens at hand the difference in the sculpture of the head, pronotum and abdomen and in the color of the under surface, as well as the less declivent and longer pronotum of *circumcinctus* lead me to keep them as distinct. Large series of both forms might, however, cause a change of opinion.

132 (218). *PERILLUS EXAPTUS* (Say), 1825, 313; II, 240.

Elongate-oval, convex. Color extremely variable, the specimens at hand having the head red, black at base; antennae fuscous-black, with incisures pale; pronotum pale red with a median black bar on front portion; scutellum black with a broad yellow margin except at base; elytra black, embolium ivory-white; connexivum black, margined with red; prothoracic pleurites and abdomen red, the sixth ventral with a median basal black spot; meso- and metapleura black; femora red, tibiae and tarsi fuscous. Head strongly declivent; cheeks coarsely confluent punctate, their margins inflexed. Pronotum rather coarsely and evenly punctate, the black transverse bar almost smooth. Scutellum finely, evenly and sparsely punctate, the margins of basal third coarsely so. Elytra finely evenly and shallowly punctured. Abdomen very finely and sparsely punctate; thoracic pleura more coarsely so. Length, 5—7.5 mm.; width, 4.5—5 mm.

Pine, Lake Co., Ind., Oct. 29; Edgebrook and Palos Park, Ill., July 4—15 (*Gerhard*). Ranges from Quebec and New England to the Pacific coast, south to New Jersey in the east and New Mexico in the west. Say's types were from Missouri. The upper surface is said to be sometimes almost wholly black, while the pronotum may be ivory-white or the basal half in great part black. The smaller size and the tubercle-like form of the femoral tooth easily separate it from the preceding species. It appears to be scarce at all its definitely recorded stations.

V. RHACOGNATHUS Fieber, 1861, 347.

Broadly oval species of medium size having the head moderately declivent, longer than broad, its apex rounded; cheeks very broad, conjointly concave, longer than tylus and contiguous in front of it; beak reaching middle coxæ, second joint slightly shorter than third and fourth united, these subequal; antennæ slender, reaching base of pronotum, joints 2 and 3 subequal, 4 one-third longer, 5 the longest; pronotum with front portion declivent, side margins straight, their front halves finely crenulate, humeri obtusely angled, not prominent; scutellum relatively short, its apical half as wide as elytra, tip broadly rounded; apex of corium oblique, feebly curved; connexivum broadly exposed; membrane very slightly surpassing abdomen; osteolar canal scarcely evident; second ventral and front femora unarmed; tibiæ flat above. Two species are known, one inhabiting the whole of Europe, the other some of the northern states and eastern Canada.

133 (219). RHACOGNATHUS AMERICANUS Stal, 1870, 33.

Broadly oval, subdepressed above, convex beneath. Fuscous or dull clay yellow; above and beneath densely marked with coarse, irregularly placed black punctures; antennæ and head black; pronotum with edge of side margins and numerous smooth, irregular wavy transverse lines on both it and scutellum, dull yellow; membrane fuscous-black; connexivum with a yellow spot or cross bar at middle of each segment; under surface black with numerous scattered smooth irregular yellow markings; legs in great part black, the base of femora and a broad ring at middle of tibiæ, yellow. Structural characters as above given. Length, 9—11 mm.; width, 5.5—6.5 mm.

Hessville, Lake Co., Ind., June 7 (*Gerhard*). Loudonville, Ohio, June 14 (*Osborn*). Described from Illinois and, up to the present, definitely recorded only from that State, Ohio, Massachusetts, Minnesota, and Winnipeg, Manitoba. *Gerhard* (Ms.) reports the taking, June 10, of a single female at Macatawa Beach, Mich. *Uhler* once recorded it from Nebraska, but the station and specimen are both unknown. Probably not more than a dozen examples are known, and, except one from Wellesley, Mass., all from the Great Lakes region of our territory.

VI. EUTHYRHYNCHUS Dallas, 1851, 104.

Rather large, elongate-oval species having the head porrect, nearly twice as long as wide, its apex subtruncate; cheeks

equalling tylus, their margins feebly sinuate in front of eyes; beak as in generic key; antennæ slender, nearly half the length of body, joints 2—5 subequal; pronotum long, strongly tapering from the humeri forward, the front portion but little declivent, its side margins straight, very finely crenulate, humeri prominent, ending in an oblong spine, its tip subtruncate, slightly bifid; apical half of scutellum narrower than corium, its tip broadly rounded; apex of corium straight, oblique; membrane slightly surpassing abdomen, its veins few, simple; connexivum broadly exposed; second ventral and front femora unarmed; tibiæ deeply sulcate above, the front ones dilated toward apex. Genital plate of male narrow, convex, its hind margin broadly, shallowly emarginate, with a semicircular concavity in front of the angle of the notch.

Two species are known, one from Brazil, South America, the other also neotropical but extending northward into our territory.

134 (220). *EUTHYRHYNCHUS FLORIDANUS* (Linnæus), 1767, 719.

Elongate-oval, subconvex. Above purplish- or bluish-black, feebly shining; pronotum usually concolorous, sometimes with front and side margins, a broad stripe at base of humeri and a median one, red; scutellum with a large spot each side of base and the apex red; connexivum with alternate black and red spots; under surface blue-black, with a broad median reddish or yellow stripe, extending from front coxæ to first or second ventrals; legs blue or blue-black, beak and base of femora reddish-yellow. Cheeks finely, closely, confluent punctate; tylus and two lines on occiput almost smooth. Pronotum finely, rather sparsely, quite evenly punctate, its front portion with several vague broad impressions. Elytra and scutellum evenly punctate, the former much more finely and sparsely so. Abdomen very finely granulate and with minute widely scattered punctures. Thoracic pleura coarsely, deeply, sparsely punctate. Structural characters as in generic description. Length, 12—17 mm.; width, 6.5—8 mm.

Sanford, Istokpoga and Dunedin, Fla., Nov. 21—April 12 (W. S. B.). Agricultural College, Miss. (Hed). Recorded from a number of other stations in Florida and probably occurs sparingly throughout the State. About Dunedin it is found in late autumn on the flowers of the shrubby Compositæ, *Garberia fruticosa* (Nutt.), and in spring on the foliage of shrubs along the borders of hammocks. North of Florida it has been recorded in this country from Pennsylvania, Georgia, North Carolina, Tennessee and Louisiana. Van Duzee (1904, 73)

says that "in Costa Rica and other tropical countries it takes on its most brilliant coloring of metallic green or blue and orange." The *Pentatoma emarginata* Say (I, 313) is a synonym.

VII. MINEUS Stal, 1867, 498.

Rather small, elongate-oval species having the head moderately declivent, its apex subtruncate; cheeks equalling tylus, conjointly concave above; beak reaching middle coxæ, its second and fourth joints subequal, third shorter; pronotum with front portion gradually declivent, its sides straight, entire, humeri not prominent, narrowly rounded; scutellum relatively small, its apical third as wide as corium, the tip broadly rounded, frena reaching its middle; membrane slightly passing abdomen, its veins few, simple; osteolar canal long, curved, very narrow; ventral spine short, slender, reaching hind coxæ; front femora unarmed; tibiæ rounded above, front ones not dilated. Males with a pair of large pubescent spaces on ventrals 4—6, their genital plate convex, its hind margin semi-circular, entire. But one species is known.

135 (221). MINEUS STRIGIPES (Herrich-Schaeffer), 1853, 338.

Elongate-oval, subdepressed above, more convex beneath. Above blue-black, shining; narrow edges of head and basal half of costal border of elytra yellow; humeri, all the margins and a narrow median line of pronotum, orange-red; scutellum black with a broad orange-red V-shaped submargin; edge of the narrowly exposed connexivum also orange-red; membrane dark fuscous; abdomen orange-red or yellow with four rows of large black spots, the two median spots united on sixth ventral; genital plate black; thoracic pleura orange-red, their margins black; legs black, the femora and tibiæ with yellow stripes. Antennæ blue-black at base, fuscous toward apex, joints 2 and 5 subequal, 3 and 4 shorter and subequal. Cheeks coarsely and densely punctate. Pronotum less coarsely, evenly punctate. Basal half of scutellum with transverse rugæ between the irregular rows of coarse punctures, apical half more finely, evenly, sparsely punctate. Elytra very finely, shallowly and evenly punctate. Abdomen, finely, evenly, not closely punctate, the pubescent spaces of male very large; thoracic pleura coarsely and sparsely punctate. Length, 9—10 mm.; width, 4.5—5 mm.

Fulton Co., Ind., July 4. Dunedin, Fla., March 21 (*W. S. B.*). Washington, D. C., June (*Davis*). Raleigh, N. Car., April—May (*Brimley*). The single Indiana specimen was taken from tall wire-grass growing in the boggy margin of a small lake, while the only Dunedin one was swept from herbage on the

side of a wet hammock. Its known range extends from Massachusetts west to Illinois and south to Florida. Barber mentions a Brooklyn Museum specimen from Florida, and it is in the Bolter collection from that State. Stal (1870) records it from Texas, and Uhler (1876) from New Mexico, but these records are questioned by Van Duzee (1917, 76).

But little mention has been made of the habits of this handsome little bug. Banks has taken it on Jersey-tea (*Ceanothus*) and Bueno (1910, 23) mentions the taking of a specimen, April 18, at White Plains, N. Y., which was "perched on a rock," so that in that region, it probably hibernates as an imago.

VIII. APATETICUS Dallas, 1851, 105.

Large elongate or broadly oval, strongly tapering Pentatomids, having the head porrect, its apex broadly rounded, slightly bifid; cheeks broad, flat, sinuate near base, a little longer than tylus; beak very stout, passing middle coxæ, the third and fourth joints subequal, second a little longer; antennæ slender, nearly half the length of body, joints 4 and 5 subequal, 2 distinctly longer, 3 shortest; pronotum twice as broad across the humeri as long, front portion moderately declivent, side margins straight, coarsely crenate, humeri usually prominent and acute or subspinose; scutellum strongly tapering, its apical half narrower than corium, the tip rounded, frena reaching its apical fourth; apex of corium straight, the inner angle rounded; membrane surpassing abdomen, its veins simple; osteolar canal long, broad, curved; front femora unarmed; ventral spine slender, reaching front margin of hind coxæ; tibiæ sulcate above, front ones not dilated. Male with third and fourth ventrals furnished each side of middle with a sparsely pubescent stridulatory area; genital plate with hind margin broadly concave.

The generic name, *Apateticus*, has, by most American authors, been used as a subgenus of *Podisus* H. S., though it antedates the latter two years. The distinctions between the two genera are few, the principal ones being those given in the key. Five species of *Apateticus* are recognized from the United States, three of which occur in our territory.

KEY TO EASTERN SPECIES OF APATETICUS.

- a. Humeral angles of pronotum obtusely rounded; female genital segment with but two basal plates. (Subgenus *Apateticus*).

136. LINEOLATUS.

aa. Humeral angles acute or subspinose; female genitalia with three basal plates. (Subgenus *Apæcilus*).

b. Connexivum narrowly or not at all exposed; basal median segment of female genital plate quadrangular; larger, 17—20 mm.

137. CYNICUS.

bb. Connexivum rather widely exposed; median basal segment of female genital plate triangular; smaller, length, 13—17 mm.

138. BRACTEATUS.

136 (222). APATETICUS LINEOLATUS (Herrich-Schaeffer), 1839, 69.

Elongate-oval, depressed above. Head, scutellum and front half of pronotum brownish-yellow, thickly marked with fuscous punctures; cheeks in great part fuscous; corium and basal half of pronotum grayish with scattered fuscous punctures; front half of pronotum with an irregular impunctate fuscous spot each side, this enclosing a small pale one; scutellum with five small pale spots across base; connexivals blackish with a central quadrate reddish-yellow spot; membrane brownish-hyaline with some vague darker stripes; antennæ brown, the incisures and base of fifth segment paler; under surface dull yellow, punctate with reddish or fuscous; femora yellow, annulate and dotted with blackish; tibiæ brown with a broad pale ring at middle; last ventral with a large piceous spot at middle. Antennæ with joints 2 and 4 subequal, longer than 3 or 5, which are also subequal. Cheeks densely, irregularly, rather coarsely punctate. Other characters as under generic heading. Length, 13—17 mm.

Brownsville, Tex., and Huachuca, Ariz., (*Barber*). A neotropical species listed by Van Duzee from Florida and Texas without definite locality. In general appearance it closely resembles *Brochymena quadripustulata* (Fabr.).

137 (224). APATETICUS CYNICUS (Say), 1831, 3; I, 312.

Elongate-oval, subdepressed above, convex beneath. Above dull clay-yellow thickly marked with small reddish or fuscous punctures; pronotum with two or three greenish dots behind the front angles; membrane brownish-hyaline; connexivum with a greenish-black bar across the ends of each segment, the middle orange-red; abdomen yellow, thickly marked with fine reddish punctures, the angles of the ends of the ventrals faintly marked with fuscous; legs yellow sprinkled with reddish dots. Cheeks finely, rather sparsely and unevenly punctate. Front half of pronotum with a triangular smooth area each side of middle, this enclosing a median group of punctures and one of the green dots. Scutellum and basal half of pronotum with numerous wavy transverse smooth lines between the irregular rows of punctures; humeral spines flattened, triangular, acute. Elytra minutely alutaceous, finely, rather sparsely and unevenly punctate. Male with upper lateral processes of genital segment rather short, broader and more flattened than in *brac-*

teatus. Other characters as given in key and under generic heading. Length, 15—20 mm.; width, 8.5—11 mm.

Scarce throughout Indiana, June 20—Sept. 5. Swept from foliage of shrubs and trees along the margins of open woods and cultivated fields, and taken in the washup of Lake Michigan. On June 28, after heavy rains, I once found eight beneath the loose bark of a dead oak on a wooded hillside in Crawford County. It ranges from Quebec and New England west to Dakota and Colorado and south to Florida, Texas and Arizona. The only Florida record which I can find is that of Barber from Jacksonville, and it probably occurs only in the northern part of that state.

Of the life habits of this and allied species in New England Kirkland (1898, 114) has written as follows:

"The adults emerge from their hibernating quarters in the spring at about the time the foliage appears. After feeding for a week or more upon the most abundant caterpillars (of the gypsy and other moths) the eggs are laid on leaves or branches of trees. The young bugs hatch in the course of a week or two, molt four times, reach the imago stage by midsummer and lay eggs for a second brood which matures early in the fall. In passing from the last nymph stage to that of the imago the number of joints of tarsi and antennæ is increased by one. Both sexes of the second brood hibernate under leaves on the ground, under the bark of trees and in other sheltered places. Nymphs of *cynicus* in the last stage have been taken frequently in June, July and August. From their late appearance it is probable that that species has but one annual brood in this region. Both nymphs and imagoes are rapacious feeders, their stout beak being a very formidable weapon. The insect attacked is impaled by a sudden thrust of the setæ which hold it firmly and in a few minutes the body fluids are sucked out. In killing large insects the setæ are sometimes wrested from the rostrum, but are readily replaced by the bug. The setæ can be moved by muscles at their base and are armed with formidable reflexed spines."

The predatory habits of *cynicus* and its nymphs are mentioned by numerous other authors, Van Duzee (1894, 170) stating that he once "found an adult with its beak deeply inserted in a full grown larva of the Cecropian moth, which it seemed to imagine it could hold by bracing itself and pulling back with all its strength. The caterpillar did not appear at all disturbed and possibly the bug might have eaten its fill without inflicting serious injury on its victim."

Stoner (1920, 122) reports *cynicus* as scarce in Iowa, the nymphs appearing in July. "On one occasion two half grown

ones were placed in a small box with two nymphs of *Brochymena quadripustulata* (Fabr.) of about the same size. Four days later the box was opened and the *Apateticus* nymphs were found alive and well while nothing was left of the *Brochymena* ones but empty skins."

138 (225). *APATETICUS BRACTEATUS* (Fitch), 1856, 336.

Broadly oval, less tapering behind than *cynicus*. Dull yellow thickly marked with reddish or greenish punctures; cheeks edged with a narrow green line; antennæ reddish-yellow, the last three joints dusky; front half of pronotum with six small green dots, four in a transverse row, the other two behind the end ones of the row; connexivals orange with a dark green oblong spot each side of each incisure; under surface pale yellow, the minute punctures along the sides brick-red, the angles of ends of ventrals black; legs darker yellow. Cheeks but slightly surpassing tylus, less so than in *cynicus*, their margins more deeply sinuate in front of eyes. Pronotum very finely punctate with numerous very narrow wavy transverse lines between the punctures; humeral angles slightly shorter and less acute than in *cynicus*. Male with upper lateral processes of genital segment long, twisted, narrow and acute. Median basal plate of female genitalia triangular, its tip obtuse. Length, 13—17 mm.; width, 8—10 mm.

Northern Illinois (*Hart*). A species of northern distribution, ranging from Quebec and New England west to Nebraska, Idaho and Vancouver. *Hart* (1919, 199) has confused *bracteatus* and *crocatus* (*Uhl.*), the latter species not occurring east of the Mississippi.

IX. *PODISUS* Herrich-Schaeffer, 1853, 296.

The members of this genus differ from those of *Apateticus*, as above characterized, mainly in their smaller size, in the shorter cheeks, which do not pass the tylus, in the absence of stridulatory areas of the male and in the structure of the genital plate of female, there being in *Podisus* but two contiguous basal plates, whereas in most species of *Apateticus* these are widely separated by a third quadrangular or triangular one. In all other essential characters they agree with *Apateticus*, and have been by most American authors treated with the species of that genus under the name *Podisus*. Seven species occur in the eastern states.

KEY TO EASTERN SPECIES OF *PODISUS*.

- a. Humeri without acute forward projecting spines; side margins of pronotum not conspicuously calloused-white.

- b.* Humeri produced in slender outward projecting spines.
c. Spines of humeri not emarginate near the tip; hind femora with two blackish dots at apical third; length, 11—13 mm. 139. MACULIVENTRIS.
cc. Spines of humeri emarginate or slightly bifid behind near tip; femora without spots; length, 10—11 mm. 140. SAGITTA.
bb. Humeri acute or obtusely angled, without slender projecting spines; hind femora with either a dark ring or immaculate.
d. Larger, 11 or more mm.; femora thickly flecked with purplish dots; abdomen with a median row of more or less distinct larger spots.
e. Antennæ pale reddish-brown throughout; median ventral spots reddish-brown, ill-defined; larger, 12.5 or more mm. 141. FRETUS.
ee. Third and fourth joints of antennæ in great part blackish; median ventral spots black, well defined; smaller, not over 11.5 mm. 142. SERIEVENTRIS.
dd. Smaller, less than 10 mm.; femora without purplish dots.
f. Membrane with a dark blotch at apex; side margins of pronotum more or less concave; humeri acute. 143. MODESTUS.
ff. Membrane without a dark blotch; side margins of pronotum straight; humeri obtusely angled. 144. PLACIDUS.
aa. Humeri ending in acute forward projecting spines; side margins of pronotum distinctly white-calloused; two spots on pronotum and apex of scutellum also calloused-white. 145. MUCRONATUS.

139 (227). *PODISUS MACULIVENTRIS* (Say), 1831a, 11; Psyche, 1899, 307.

Elongate-oval, strongly tapering behind, subdepressed above, convex beneath. Above dull yellow, thickly marked with small fuscous punctures; narrow edge of side margins of pronotum and tip of scutellum yellow; antennæ reddish-brown, the third and fourth joints often in part

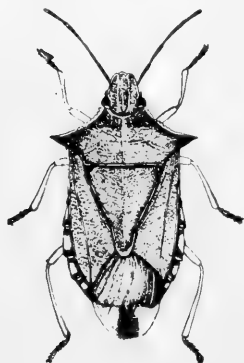


Fig. 38, X 3.
(After Lugger).

fuscous; membrane hyaline, usually with a short, fuscous subapical blotch; apical half of elytra often tinged with purplish-red; segments of connexivum with ends and inner margin blue-black, the middle with an oblong orange-red spot; under surface pale yellow with numerous small reddish punctures; abdomen with one or two rows of small spots each side and the angles of the ends of ventral segments, black; sixth ventral always with a rather large median triangular black spot, and ventrals 3—5 often with smaller median ones; thoracic pleura each with one or two small submedian dark spots; legs reddish-yellow, all the femora with a pair of black dots at apical third. Head flat, almost as broad across the eyes as long, apex subtruncate; cheeks thickly, unevenly, finely punctate; beak reaching middle of hind coxæ; second joint of antennæ one-half or more longer than third,

fourth and fifth shorter, subequal. Pronotum with front portion gradually declivent, its side margins broadly but evidently concave, their front portion distinctly crenate; humeri usually acutely spinose, rarely only acute-angled; disk of both pronotum and scutellum with numerous narrow wavy smooth lines between the irregular rows of punctures. Elytra minutely alutaceous, finely sparsely irregularly punctate. Abdomen with sides finely, sparsely rugosely punctate, the middle almost smooth; ventral spine reaching middle of hind coxæ, its apex rounded. Length, 11—13.5 mm.; width, 6—8 mm. (Fig. 38).

Common throughout Indiana, January—November; most frequent, June to August, on tall weeds in alluvial soil along streams and in dense woodland. Hibernates as imago beneath mullein and piles of dead leaves. A specimen was taken June 27 feeding on a larva of the milkweed butterfly and another, Nov. 4, feeding also on a lepidopterous larva. Dunedin. Sarasota and Istokpoga, Fla., Dec. 15—March 29. Frequent about Dunedin in February and March on foliage of shrubs along the margins of hammocks. These Florida specimens have the membrane of elytra immaculate or rarely with a faint trace of the fuscous blotch found in the northern ones. The presence or absence of this blotch has been used as one of the principal differential characters in the keys of Van Duzee, Kirkland, and others, but it is evidently an unreliable one.

This well known bug, up to 1899, was known in literature as *Podisus spinosus* Dallas (1851, 98), but Mr. S. H. Scudder in that year found in the library of the Boston Society of Natural History a copy of an unknown paper of Thomas Say,³⁸ not contained in the "Complete Writings" of that author, in which this species was described from Louisiana as *Pentatoma maculiventris*, this specific name, therefore, antedating that of Dallas by twenty years.

The known range of *P. maculiventris* is a wide one, extending from Quebec and New England to the Pacific and south and southwest to Florida and Arizona. It appears to be scarce in Florida, as, aside from the stations above named, it has been taken only at St. Petersburg and Sanford (Van Duzee, 1909, 158). Morrill (1906, 160) records the keeping of a pair of these bugs in captivity for 55 days, during which time they destroyed and ate 246 larvæ of the elm leaf beetle and seven large caterpillars. The female began laying eggs nine days

³⁸"Descriptions of New Species of North American Insects, found in Louisiana by Joseph Barbarino." New Harmony, Ind., March, 1831. See Psyche, VIII, 1899, 306.

after reaching the adult stage, and during 40 days laid 18 batches, comprising altogether 492 eggs. The average period of incubation was seven days and one hour, the average duration of the immature stages of 17 specimens was 46 days and the average adult life of captive specimens 48 days. Lists comprising more than 30 injurious insects which are destroyed by this bug are given by Kirkland (1898, 134) and Hart (1919, 201). Chief among these are the larvæ of the Colorado potato beetle, elm leaf beetle, striped cucumber beetle and asparagus beetle, web-worm, caterpillar and codling moth. The young have also been reared on the evening primrose, *Onagra biennis* L., by Olsen.

140 (231). *PODISUS SAGITTA* (Fabricius), 1794, 99.

Form and general habitus of *P. maculiventris*. Color much the same, the margins of cheeks, a line each side of tylus and the humeral spines, blackish; membrane with a long median fuscous patch at tip; abdomen with two rows of small dark spots each side; thoracic pleura with numerous coarse black punctures. Head longer and more sparsely punctate than in *maculiventris*, the cheeks conjointly concave. Humeral spine more upcurved and with a blunt projection on its hind margin near tip, this giving it a slightly bifid appearance. Length, 11—12 mm.; width, 7—7.5 mm.

Orizaba, Mexico, July 27 (*W. S. B.*). A neotropical species, mentioned by Van Duzee (1917, 80) as occurring in this country only in Texas; but Barber (1914, 524) records it from St. Augustine and Miami, Fla.

141 (227½). *PODISUS FRETUS* Olsen, 1916, 82.

Elongate-oval, larger than *maculiventris*. Dull clay-yellow, thickly marked above with reddish-brown punctures, beneath with reddish-purple spots and punctures; narrow edges of front half of side margins of pronotum and a small spot on each basal angle of scutellum, calloused ivory-white; embolium and apical half of corium tinged with reddish; antennæ reddish-brown throughout; membrane brownish-hyaline, with a blotch at tip and a triangular spot at inner basal angle, fuscous; abdomen without black spots, its middle with a row of vague reddish-brown ones; legs thickly flecked with reddish dots, femora without black spots. Color markings otherwise as in *maculiventris*. Head broader and more thickly punctate above than there, the side margins of cheeks parallel. Pronotum with humeri short, broad, obtusely rounded, side margins almost straight, their dentations coarse, bluntly rounded. Structure otherwise as in *maculiventris*. Length, 12.5—14 mm.; width, 6.5—7.5 mm.

Lake County, Ind., June 10 (*W. S. B.*); taken from the wash-up of Lake Michigan. Macatawa Beach, Mich., June 10 (*Ger-*

hard). Originally described from specimens taken along the Atlantic coast from Massachusetts to Wilmington, N. Car. The types in part were beaten from oak and pine and others were taken from washup along the ocean beaches. The Indiana and Michigan specimens are the only ones known from the interior. "Readily distinguished from *maculiventris* by the broader and proportionally shorter anterior part of head; by its straighter anterior lateral margins of pronotum; by the rounded humeri and lack of humeral spine; by the median ventral spots being large, dull red-brown and not sharply defined, never shining black; by the venter being profusely marked with red and red-brown spots and blotches and by the larger size, more robust appearance and general darker color." (*Olsen*).

142 (228). *PODISUS SERIEVENTRIS* Uhler, 1871, 94.

Oblong-oval, depressed above, convex beneath. General color above much as in *maculiventris*, but usually a little darker, rarely strongly tinged with reddish; edges of front side margins of pronotum and a triangular spot on each basal angle of scutellum, calloused ivory-white; humeri blackish; membrane with a blotch at tip and inner basal angle fuscous; antennae reddish-brown, the third and fourth joints in great part fuscous; under surface pale yellow, thickly sprinkled with reddish and fuscous punctures; sides of abdomen each with two rows of small dark spots, the angles of the ends of the ventrals black; middle of abdomen with a row of four larger sharply defined black spots, the one on sixth ventral much the largest; thoracic pleura with the punctures coarser and usually aggregated to form an irregular dark median stripe; legs flecked with purplish dots, the hind femora with a fuscous or purplish ring near apex. Head as in *maculiventris*. Pronotum with side margins feebly but evidently concave, their front portion with rounded crenations; humeri broad, triangular, their tips obtusely angled; disk with punctures aggregated near front angles and on the sides of front portion to form four to six ill-defined fuscous spots. Ventral spine short, not reaching hind coxæ. Length, 9.5—11.5 mm.; width, 5.5—6.5 mm.

Fulton and Crawford counties, Ind., Sept. 10—Oct. 7; in the former swept from marsh grass near the edge of a tamarack swamp (*W. S. B.*). Porter Co., Ind., Aug. 28 on tamarack (*Gerhard*). Ranges from Quebec and New England westward through southern Canada and the northern states to the Pacific. Recorded south of New Jersey only from Southern Pines, N. Car. Uhler states (1878, 371) that this species was named *Pentatoma serieventris* by Say, but the description was never published. Kirkland (1898, 130) says that in Massachu-

setts it is "by far the most common representative of the genus," but this statement is not borne out by the Massachusetts records given by Parshley (1917, 29). It is known to prey upon the larvæ of numerous moths, a list being given by Kirkland (loc. cit.), who states that "in April and May an inspection of the webs of the tent caterpillar will show numbers of these bugs breaking their winter's fasts upon the inmates of the webs." The life habits, number of broods, etc., are essentially the same as described under *A. cynicus* Say. It appears to be scarce at most of its recorded stations, but is probably confused in many collections with *maculiventris*. It is, however, less closely allied to that species than to *fretus*, the latter being distinguished from it, according to Olsen, by "its much larger size, long median ventral spine, absence of dark annulus on femora, more reddish color ventrally and by the median row of ventral spots being dull red-brown and not sharply defined."

143 (229). *PODISUS MODESTUS* (Dallas), 1851, 101.

Form of *maculiventris* but smaller. Color above much as there, but in general with fewer fuscous punctures and therefore a little paler; antennæ reddish-yellow, the tips of joints 4 and 5 often fuscous; embolium and apex of corium usually tinged with red; membrane hyaline, with a fuscous spot at apex; under surface pale yellow; abdomen with a row of small spots or dots each side, the spiracles and the angles of the ends of ventral segments dark brown or black, a median row of small spots also sometimes present; legs reddish-yellow. Head as in *maculiventris*; second joint of antennæ relatively short, about three times as long as first. Pronotum with humeri triangular, subacute; side margins distinctly concave, their dentations coarse, obtuse. Abdomen rugosely, shallowly and rather coarsely punctate; ventral spine short, not reaching hind coxæ. Length, 9.5—10.5 mm.; width, 4.5—5.5 mm.

Kosciusko and Crawford counties, Ind., June 19—Aug. 30; taken while sweeping low herbage in woods. Northern Illinois (*Ill. Nat. Hist. Surv. Coll.*). Ranges from Quebec and New England west to British Columbia and Montana, and, according to Uhler, "south to Georgia." The types of Dallas were from Trenton Falls, N. Y., and Cincinnati, Ohio, and according to extant definite records it is rarely if ever found south of latitude 38 degrees. Kirkland states (1898, 120) that in Massachusetts it is common in May, feeding upon tent caterpillars, that it hibernates beneath leaves and in summer is more frequently found on bushes and low growing plants than on trees. Like other species of the genus it is predatory upon

larvæ of various insects. He adds: "The deeply sinuate humeral angles, red marking at tip of corium, light colored tergum, short ventral spine and short segment of antennæ, are characteristic of *modestus* and will serve to distinguish it." Stoner found it in Iowa only at Robinson, where it was frequent in August on hazel.

144 (230). *PODISUS PLACIDUS* Uhler, 1870, 203.

Oblong-oval, subdepressed. Pale yellow, above thickly and unevenly marked with small reddish-brown punctures; edges of front side margins of pronotum and numerous narrow wavy lines across its disk and that of scutellum, subcalloused ivory white; antennæ reddish-brown, the last two joints paler; edge of cheeks blackish; elytra slightly tinged with reddish; membrane uniform pale brown; connexivum orange-red with a blackish spot on each incisure; abdomen sprinkled with minute reddish punctures, often with a row of small reddish-brown spots each side, the angles of ends of ventrals each with a blackish point. Head as wide across the eyes as long, its apex broadly rounded; cheeks and tylus unevenly sparsely punctate. Pronotum with side margins straight, finely crenate before the middle; humeral angles obtusely rounded. Elytra rather closely, finely and shallowly punctate. Length, 7.5—9 mm.; width, 5—6 mm.

Riverhead and Yaphank, Long Island, N. Y., July—August (*Davis*). Ranges from Quebec and New England west to Colorado, but not recorded south of New Jersey. Though not as yet noted in Indiana it doubtless occurs in the northern counties, as it is recorded from both Michigan and Illinois. Kirkland (1898, 117) states that in Massachusetts the imagoes of the fall brood hibernate and emerge about the middle of May, feeding first upon the tent caterpillar (*Clisiocampa americana* Harr.) and afterward upon the larvæ of the gypsy moth and other Lepidoptera. From 50 to 60 eggs are deposited by each female, these being placed in batches on the under side of leaves or on twigs. They hatch in about ten days and the young feed on the juices of leaves for a week or so, when the first molting takes place. From this time on they are predaceous. The second and third molts take place in 12 and 10 days, respectively, and the last one in about three weeks. The imagoes of the summer brood appear during July and those of the fall brood in September. Olsen (1912, 57) says that this bug is common throughout the pine region of Long Island and in the washup at Rockaway Beach, the food plant being probably scrub-oak. Stoner has taken it in Iowa on hazel. The

small size, short broad head with black line on edge of cheeks, the uniform brown hue of the membrane, and the obtusely rounded humeri are the principal characters distinguishing this species from its allies.

145 (233). *PODISUS MUCRONATUS* Uhler, 1897a, 386.

Elongate-oval, subdepressed above, convex beneath. Pale yellow, above thickly and unevenly marked with rather coarse reddish-brown punctures; head with four narrow stripes formed of blackish punctures; edges of cheeks and humeral spines blackish; broad side margins of pronotum, two spots on its disk, three across base of scutellum and the tip of latter, subcalloused ivory-white; membrane dark brown without fuscous markings; connexivum yellow, the inner angles of the segments blackish; under surface and legs uniform pale yellow, the tarsi a little darker. Head slightly longer than wide, its apex rounded; cheeks sparsely unevenly punctate. Pronotum with side margins wide, flattened and straight in front of the base of the acute and prominent forward projecting spines; disk of front portion sparsely and very unevenly punctate, of hind one more closely and evenly so. Scutellum with basal portion sparsely punctate, the apical half more closely so, the apex smooth. Elytra more finely, evenly and closely punctate. Under surface sparsely, rather coarsely and shallowly punctate. Osteolar canal short, not at all curved, the apex rounded. Length, 9—11.5 mm.; width, 5—6.5 mm.

Ormond, Kissimmee, Dunedin, Ft. Myers, Caxambus and Cape Sable, Fla., Dec. 1—April 6 (*W. S. B.*). Recorded from a number of additional stations by Van Duzee and Barber, and probably occurs sparingly throughout the eastern and southern portions of the State. Known in this country only from Florida, but Uhler's types were in part from Cuba. My specimens were taken singly, mostly by beating cabbage palmetto and other foliage along the margins of dry sandy cultivated fields or by sweeping along the bay front. A prettily marked and easily distinguished species.

X. *ZICRONA* Amyot & Serville, 1843, 86.

Small, oblong-oval subconvex species having the head feebly declivent, as wide across the eyes as long; cheeks convex, equalling tylus; beak short, stout, reaching middle coxæ, its second joint one-half longer than third, the latter equal to fourth; antennæ pubescent, surpassing hind margin of pronotum, joints 2, 4 and 5 subequal, third nearly one-half shorter; pronotum with front portion but slightly declivent, its side

margins almost straight, their edges obtuse, humeri narrowly rounded, not prominent; scutellum relatively small, its apical third strongly tapering, much narrower than corium, the tip narrowly rounded, male, almost as wide as corium, the tip broadly rounded, female; membrane surpassing abdomen, its veins simple; connexivum narrowly or not at all exposed; osteolar canal very narrow, curved, lying close to the front edge of the metasternal plate; front femora and second ventral unarmed; tibiæ not sulcate, tarsi 3-jointed. Males without a pubescent spot on ventrals 4—6; their genital plate semi-circular, its hind margin reflexed, broadly concave.

Two species are known, one inhabiting Europe, the other Canada and the United States.

146 (—). *ZICRONA CUPREA* Dallas, 1851, 108.

Oblong-oval, subconvex. Above dark purplish-blue, shining, the pronotum and scutellum varying to dark greenish-blue; antennæ and membrane of elytra fuscous-black; under surface purplish to greenish-blue; legs and beak black, the tarsi fuscous. Entire upper surface finely, sparsely but very evidently punctate. Basal half of scutellum with numerous fine transverse wrinkles between the punctures. Under surface minutely and sparsely punctate. Other structural characters as above given. Length, 7—9 mm.; width, 3.5—4 mm.

Gila River, New Mexico, July (*Gerhard*). Texas (*Osborn*). The types of Dallas were from Hudson's Bay, and it is known from Maine, New Hampshire and Michigan, west to British Columbia, California and Arizona, but in the east not south of latitude 42 degrees. It occurs for the most part in high altitudes, the New Hampshire specimens being taken on the summit of Mt. Washington.

Although Uhler (1872, 395) said that he could find no sufficient differences to separate the American form from the European *Z. cærulea* (Linn.), he continued to treat the former as distinct in all his subsequent writings. In this he has been followed by almost all American writers except Van Duzee. A comparison of Arizona and Texas specimens with some of typical *Z. cærulea* from Bucharest, shows the latter to be wholly greenish-blue in hue, with the upper surface distinctly smoother, the punctures sparser and more shallow and the scutellum wholly devoid of the transverse wrinkles found in the American form. I have therefore retained the name of Dallas for our species.

Subfamily III. ACANTHOSOMINÆ Stal, 1864, 33.

Pentatomids of medium or small size, having the thorax armed beneath with a prominent central carina or keel which extends the full length between all the coxæ; abdomen also with a prominent median carina, the sharp curved apex of which extends forward between the hind coxæ and overlaps that of the sternum; bucculæ and beak as in subfamily Pentatominae; tarsi two jointed.

This subfamily is placed by Van Duzee between the Pentatominae and Asopinae, but since the variation in the number of tarsal joints is, in the Coleoptera, deemed of sufficient importance to serve as the primary character in separating not only families, but even series of families, it is, in my opinion, of enough value here to warrant the isolation of those Pentatomids possessing only two tarsal joints and the placing of them in a group following those which have three. The subfamily comprises a dozen or more genera, mostly neotropical in distribution. It is represented in North America and the eastern states by only two of these.

KEY TO EASTERN GENERA OF ACANTHOSOMINÆ.

- a.* Posterior side margins of pronotum depressed, their inner end projected slightly backward opposite basal angle of scutellum; outer hind angle of sixth ventral not strongly produced backward; osteolar canal short, broad, curved, scarcely reaching middle of its supporting plate; smaller, not over 9 mm. I. MEADORUS.
- aa.* Posterior side margins of pronotum not depressed, their inner end not projected backward; outer hind angle of sixth ventral acute, strongly produced backward; osteolar canal straight reaching much beyond middle of the metasternal plate; larger, 10 or more mm. II. ELASMOSTETHUS.

I. MEADORUS Mulsant & Rey, 1866, 315.

Small oblong-oval species having the head moderately declivent, longer than wide, its apex rounded; tylus slightly longer than cheeks, its tip rounded; beak slender, surpassing hind coxæ, its second and third joints subequal, fourth shorter; pronotum with front portion strongly declivent, its side margins straight, entire, front angles with a small projecting tooth, humeri obtusely angled, feebly concave or emarginate behind the angle; scutellum short, strongly tapering, the apical third only half the width of corium, tip narrowly rounded; membrane surpassing abdomen, its veins simple; connexivum

rather broadly exposed. Female with basal genital plates much longer than broad. Other characters as in key, and under subfamily heading. One species is known.

147 (203). *MEADORUS LATERALIS* (Say), 1831, 3; I, 312.

Oblong-oval, subdepressed above, subconvex beneath. Above green-

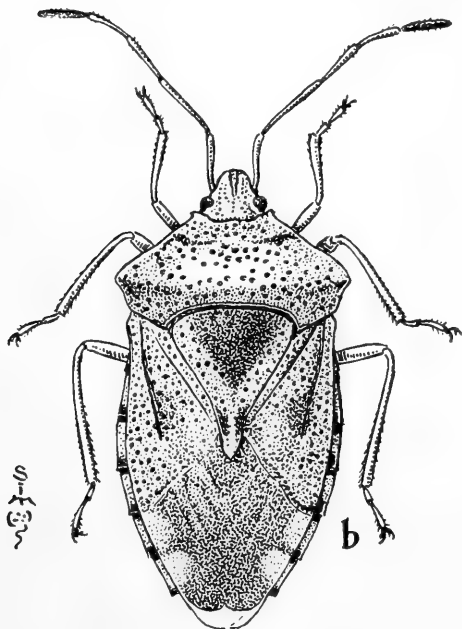


Fig. 39, X 8. (After Drake in Tech. Pub. No. 16, N. Y. St. Coll. For.)

ish yellow, rather evenly, not thickly marked with coarse reddish-brown punctures; antennæ reddish-yellow, the tip of last joint blackish; elytra with two vague reddish-brown or pale fuscous cross-bars; connexivum yellow, with an oblong blackish spot on each incisure; tergum reddish; under surface pale yellow, the punctures darker; legs reddish-yellow. Cheeks sparsely unevenly punctate; tylus almost smooth, its front half widened and with a median groove. Pronotum with front portion unevenly punctate, the smooth areas irregular and transverse; hind portion evenly and coarsely punctate. Scutellum very coarsely and sparsely punctate; elytra more finely and rather closely so. Abdomen with minute distant

punctures, those of thoracic pleura coarser. Length, 7.5—8.5 mm.; width, 4.5—5 mm. (Fig. 39).

Mackinac Island, Mich., July 23 (*W. S. B.*). Minnesota (*Ill. Nat. Hist. Surv. Coll.*). Ranges from Quebec and New England west to the Pacific. Not as yet recognized from Indiana or Illinois and in the east not recorded south of New Jersey. But little regarding its habits is known. Van Duzee took it in the Adirondacks of New York by beating trees. Except in New England, where the records given by Parshley are numerous, it appears to be scarce throughout its range.

II. *ELASMOSTETHUS* Fieber, 1861, 78.

Medium sized, elongate-oval species, differing from *Meadorus* mainly by the characters given in generic key. The head is

relatively more narrowed in front, the cheeks more deeply sinuate in front of eyes; pronotum with humeri not emarginate or concave behind the angles, the posterior side margins straight; scutellum much narrower toward apex, the latter less than one-third the width of corium. Female with basal genital plates subtriangular not longer than wide. Three species are known from the United States, two of which occur in our territory.

KEY TO EASTERN SPECIES OF ELASMOSTETHUS.

a. Antennæ pale, the apical joint dusky; humeral angles pale.

147. CRUCIATUS.

aa. Antennæ piceous or black throughout; humeral angles black.

148. ATRICORNIS.

148. (204). *ELASMOSTETHUS CRUCIATUS* (Say), 1831, 2; I, 311.

Elongate-oval, subdepressed above, convex beneath. Above greenish-yellow, bases of pronotum and scutellum and a broad stripe along inner margin and apex of elytra, dull red; under surface and legs dull yellow; tarsi and tip of beak fuscous, the acute strongly projecting angles of sixth ventral reddish-brown. Head as long as broad, strongly tapering; cheeks with a few coarse punctures near base. Pronotum very sparsely, unevenly marked with coarse reddish-brown or fuscous punctures. Scutellum evenly and more closely marked with similar punctures. Elytra more finely, closely and evenly punctate. Abdomen smooth or very minutely rugose; pro-thoracic pleura coarsely and rather closely punctate. Other characters as in key and under generic heading. Length, 10–11 mm.; width, 5.5–6 mm. (Fig. 40).

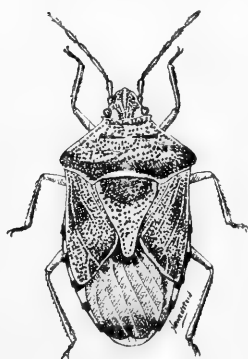


Fig. 40, X 3.
(After Lugger).

Adirondack Mountains, N. Y., July 6—Aug. 29 (*Davis*). Lake Superior (*Ill. Nat. Hist. Surv. Coll.*). Ranges from Quebec and New England west to the Pacific and south to North Carolina and New Mexico. Nothing has been recorded regarding its habits, though it appears to frequent more mountainous regions and higher altitudes than does *E. atricornis*. Say states that “when the hemelytra are at rest their sanguineous margins represent a common cross,” whence the specific name which he bestowed upon it. Hart records one specimen from northern Illinois, but no members of the subfamily are mentioned by Zimmer or Stoner from Nebraska or Iowa.

149 (206). ELASMOSTETHUS ATRICORNIS (Van Duzee), 1904, 75.

Size and form of *cruciatus*. Above greenish-yellow; antennæ blackish, the incisures paler; humeral angles of pronotum black, this merging into dark reddish-brown along the hind margin and on inner and apical margins of elytra, disk of scutellum and connexivum; under surface reddish-brown, the last two ventrals piceous, shining. Head a little shorter and broader than in *cruciatus*, the cheeks with only two or three punctures and a few very fine wrinkles. Pronotum more finely and very sparsely punctate, the punctures concolorous with the disk. Punctures of scutellum finer and more unevenly and sparsely placed than in *cruciatus*. Basal plates of female genitalia a little shorter and more triangular than there. Sixth ventral of male very deeply concave to receive the broad convex genital plate, the latter with hind margin rounded, entire and ciliate. Length, 9—10 mm.; width, 5—5.5 mm.

Putnam and Vigo counties, Ind., Aug. 21—Sept. 18. In both counties it was found in numbers and mating, but only on the leaves and stems of spikenard, *Aralia racemosa* L., growing on the sides of deep damp ravines. Outside of Indiana it is definitely recorded only from Montreal, Canada, New York and Maryland, though Van Duzee (loc. cit.) says "so far as my observations extend this seems to be our most common northern species of *Acanthosoma*." It will probably be found on the *Aralia* throughout most of the range of that plant.

Superfamily COREOIDEÆ Reuter, 1910, 78.

This superfamily comprises Heteroptera of large or medium size, possessing the characters given in the family key and having the head porrect or nearly so, not transversely impressed; scutellum triangular, small or medium in size, but not reaching middle of abdomen; elytra composed of clavus, corium and membrane; veins of membrane numerous, more or less anastomosing; hind femora often swollen; tarsal claws with arolia.

The superfamily is represented in our territory by three families, two of which are by Van

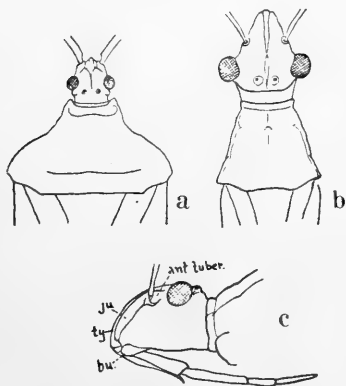


Fig. 41. a, dorsal view of head and pronotum of a Coreid, *Anasa repetita* Heid.; b, same of a Coreid, *Coriscus pilosulus* (H.S.); c, lateral view of same. (After Parshley).

Duzee and others treated as subfamilies of the Coreidæ.

KEY TO FAMILIES OF COREOIDEÆ.

- a. Osteolar openings distinct,³⁹ located on their peritreme some distance outward from the middle and hind coxæ; both fourth and fifth dorsals of abdomen concavely sinuate at base; color usually dark; length usually 10 or more mm.
- b. Head much narrower and shorter than pronotum (fig. 41, a); bucculæ larger, reaching backward behind a vertical line drawn from the base of the antennæ (fig. 6, k); form usually rather broad. Terrestrial or thamnophilous; usually phytophagous.
Family VI. COREIDÆ, p. 208.
- bb. Head proportionally much larger, the part between the eyes wider than base of scutellum (fig. 41, b); bucculæ very small, lying wholly in front of the base of antennæ (fig. 41, c); form usually elongate and slender. Terrestrial or thamnophilous; phytophagous.
Family VII. CORISCIDÆ, p. 256.
- aa. Osteolar openings (in our species) absent; fourth dorsal only concave at base; color usually pale; length (except in tribe Leptocorini), less than 10 mm. Terrestrial; phytophagous.

Family VIII. CORIZIDÆ, p. 270.

Family VI. COREIDÆ Leach, 1815, 121.

THE SQUASH-BUG FAMILY.

Heteroptera of medium or large size and elongate-oval form, having the head very small, porrect or nearly so; antennæ 4-jointed, inserted on the upper part of the sides of the head; beak 4-jointed; ocelli present; pronotum quadrangular or sub-hexagonal, widest behind, the front of disk strongly declivent; scutellum relatively small, triangular, not reaching middle of body, the clavi meeting behind its tip; corium with apex long, oblique, sinuate, its outer apical angle usually acute; membrane but slightly or not surpassing the abdomen, its veins numerous, usually forked, arising from a curved transverse basal vein; connexivum usually broadly exposed; osteole present, its opening large, situated between or near the bases of the meso- and metasternal plates; tarsi 3-jointed, the last joint furnished with pulvilli. Males with a single convex genital plate; females with sixth ventral slit along the middle to near base and with several small genital plates separated by distinct sutures.

The family is a large one, nearly 1,600 species, assigned to no fewer than 27 subfamilies, being known, mostly from the tropical regions, where many of them are large in size and of bizarre form. By the older writers they were known as Super-

³⁹Except in the genera *Tollius* and *Stachyocercus* of the Coriscidæ.

icornia on account of the insertion of the antennæ on the upper side of the head above a line projected from the eyes to the base of the beak. They are mainly plant feeders and some of them, as our common squash-bug, often so numerous as to do much damage to vegetation. When distributed almost all of them emit, from the large opening of the stink-gland, copious quantities of a volatile liquid, the odor of which soon permeates the atmosphere for rods around, being more penetrating and more offensive than in most other Heteroptera.

The literature pertaining to the species of our fauna is widely scattered, no single work treating of the family as a whole. The principal papers available are as follows: Stal, 1867, 1870; Gibson, 1917; Gibson and Holdridge, 1918, 1918a; McAtee, 1919; Fracker, 1923. Aside from the Coriscinæ (Alydinæ) and Corizinæ treated in this work as families, but three of the 27 subfamilies are represented in North America, all in our territory. Our eastern species are comparatively few in number, but 38 being at present known.

KEY TO NORTH AMERICAN SUBFAMILIES OF COREIDÆ.

- a. Upper surface not thickly beset with small setæ-bearing granules; first joint of antennæ rarely shorter than head; hind coxæ widely separated.
- b. Apex of hind tibiæ ending beneath in a short projecting spine; fourth joint of antennæ longer than second and third united; hind femora curved, strongly clavate, the basal half very slender, the apical one much thickened and spined beneath; length less than 9 mm. Subfamily I. MEROCORINÆ, p. 209.
- bb. Apex of hind tibiæ without a projecting spine; hind femora rarely curved and strongly clavate; head much narrower and shorter than pronotum; bucculæ reaching behind the insertion of antennæ; length usually 10 or more mm. Subfamily II. COREINÆ, p. 212.
- aa. Upper surface, except membrane, thickly beset with small granules, each bearing a short seta; first joint of antennæ shorter than head; hind coxæ contiguous or nearly so.

Subfamily III. PSEUDOPHLÆINÆ, p. 254.

Subfamily I. MEROCORINÆ Stal, 1870, 125.

This subfamily, distinguished by the characters given in key, is represented in North America by the single genus:

I. MEROCORIS Perty, 1830, 170.

Cblong-oval pubescent species of medium size having the head small, porrect, much shorter than pronotum, armed above

near base of each antenna with a short spine; antennæ stout, joint 1 curved, 2 and 3 more slender, subequal, 4 longer than 2 and 3 united; beak reaching middle coxæ, joints 1 and 2 subequal, slightly longer than 3 and 4 which are also subequal; eyes prominent, subglobular; pronotum subquadrangular, sides straight, feebly converging forward from the acute hind angles, disk strongly declivent; scutellum short, triangular, its apex acute, base with a short erect blunt spine each side; apical margin of corium long, oblique, feebly sinuate, the outer angle acute; membrane reaching tip of abdomen, its veins very numerous, mostly simple; connexivum narrowly exposed; osteolar opening located in front of hind coxæ, without canal or auricle; hind coxæ extremely widely separated, hind femora as described in subfamily key, armed beneath with four or five erect slender spines, hind tibiæ slender, feebly curved, the apex ending in a short spine.

Two species and one western variety are known, both species occurring in the eastern states.

KEY TO EASTERN SPECIES OF MEROCORIS.

- a. Head subquadrate, not prolonged in front; first joint of antennæ stout, subcylindrical, constricted only near base, thickly bristly-hairy; beak just reaching middle coxæ. 150. *DISTINCTUS*.
- aa. Head subtriangular, prolonged in front between the bases of antennæ; first joint of antennæ subclavate, tapering below the middle, sparsely, finely pubescent; beak reaching behind middle coxæ. 151. *TYPHÆUS*.

150 (236a). *MEROCORIS DISTINCTUS* Dallas, 1852, 419.

Oblong-oval, clothed, except on membrane, with a thick matted pubescence. Above fuscous, the pubescence fulvous or grayish; third joint of antennæ and some lines on middle of pronotal disk dull red; connexivum black, the ends of each segment red; membrane brownish-black; under surface in great part reddish, the pubescence grayish; middle of abdomen and sternal pleura blackish; legs fuscous, thickly marked with reddish dots and lines. Head with a pair of short, widely separated divergent spines, one above the base of each antenna; ocelli each placed on the side of an occipital tubercle. Pronotum with three or four short blunt tubercles along each side margin and numerous scattered ones on disk. Other structural characters as in generic description. Length, 7.5—8.7 mm.; width, 3—3.5 mm. (Fig. 42).

Lake, Vigo, Knox and Posey counties, Ind., scarce, June 2—



Fig. 42, X 8. (Original).

Oct. 16; probably occurs sparingly throughout the State (*W. S. B.*). Palos Park, Ill., Oct. 8 (*Gerhard*). Found in summer and autumn on flowers of the purple milkwort, *Polygala viridescens* L., goldenrod and other herbs growing along railways and roadsides. Ranges from New England to Kansas and Oklahoma, and south to Florida and Texas. In Florida it has been recorded from Crescent City and Estero by Van Duzee, but Barber states (1914, 518) that these records are probably based on examples of *typhæus*. Uhler (1876, 295) says that: "In Maryland it is often

common in corners of fields adjoining woods where the weeds and shrubs grow luxuriantly. In such places it may be swept from the plants as late as the middle of October." Parshley (1914, 147) records the taking May 10 at Orono, Me., of 12 specimens "as they flew up, one by one, to the dried carcass of a long dead fowl. Some alighted nearby and others disappeared within the carcass. I was unable to determine whether they came to feed on the juices of carrion or to prey upon other insects, and they may have been attracted merely by the odor. I believe there are few if any records of the frequenting of carrion by Heteroptera."

151 (236). *MEROCHORIS TYPHÆUS* (Fabricius), 1798, 537.

Differs from *distinctus* mainly by the characters given in key. Slightly shorter and more slender, color much the same; pubescence less dense. Head distinctly more prolonged and more narrowed in front of antennæ, the tylus more convex and prominent; antennæ more slender, less bristly-haired, the basal joint dark chestnut-brown, shining, almost glabrous, more slender, more curved and more tapering toward base than that of *distinctus*; apical joint also more tapering toward base, thickest beyond middle, in *distinctus* of nearly equal thickness beyond the basal fourth. Antenniferous tubercles shorter and less divergent. Pronotum narrower, the sides less convergent with fewer tubercles along the edges; humeri less prominent; disk more even with fewer tubercles than in *distinctus*. Length, 7—8 mm.; width, 2.7—3 mm.

Dunedin, Fla., Nov. 26—April 16; swept from avocado; also from flowers of the orange milkwort *Polygala lutea* L., along the

borders of a pond (*H. S. B.*). Mobile, Ala., June (*Gerhard*). This species has been generally confused with *distinctus* and it is therefore impossible from the published records to give its approximate range. Barber (1914, 518) states that "it is confined, as far as my knowledge goes, to the extreme southeastern United States." He records it from Ft. Myers, Indian River and Lakeland, Fla. Bueno and Engelhardt (1910, 149) record both species from Wilmington, N. Car., and *typhæus* also from Virginia Beach, Va. The two species are easy to separate when one has specimens of both in hand, but quite difficult from the literature extant.

Subfamily II. COREINÆ Stal, 1867, 535.

This subfamily, as defined in the key, comprises the great majority of our species of Coreidæ and for convenience of classification is subdivided into eight tribes, all of which are represented in the eastern United States.

KEY TO TRIBES OF SUBFAMILY COREINÆ.

a. Hind tibiæ in both sexes dilated on one or both sides (fig. 43) to form a thin foliaceous plate.

b. Head but little prolonged in front of bases of antennæ; tylus longer than cheeks, compressed between them and projected upward between the antenniferous tubercles in the form of a triangular spine; basal joint of antennæ at least one-half longer than head.

Tribe I. ACANTHOCEPHALINI, p. 213.

bb. Head narrowed in front and much prolonged beyond the bases of antennæ; tylus longer than cheeks, compressed and deflexed in front of them; basal joint of antennæ but little if any longer than head.

Tribe II. ANISOSCELINI, p. 219.

aa. Hind tibiæ simple, terete or subcylindrical.

c. Head as long, or nearly as long, as pronotum, distinctly narrowed and prolonged in front of bases of antennæ; femora armed beneath.

d. Second and third joints of antennæ not triquetrous or three-sided; cheeks not porrect or distinctly shorter than tylus.

Tribe III. LEPTOSCELINI, p. 226.

dd. Second and third joints of antennæ triquetrous; cheeks porrect, shorter than tylus, their tips subconical.

Tribe VII. CHELIDININI, p. 240.

cc. Head not over two-thirds the length of pronotum, but little produced forward in front of bases of antennæ.

e. Hind femora armed beneath with a number of teeth and in the males strongly swollen; front side margins of pronotum finely toothed or crenulate.

Tribe IV. MICTINI, p. 228.

- ee. Hind femora unarmed beneath, or if armed, with only two or three small teeth, not much swollen in either sex; front side margins of pronotum rarely (Tribe VI) distinctly toothed.
- f. Antenniferous tubercles very prominent, the cheeks and tylus strongly abruptly deflexed, the space between the tubercles therefore unfilled.
- g. Third joint of antennæ not dilated near apex; antenniferous tubercles without a spine; form broadly oval.
Tribe V. MENENOTINI, p. 234.
- gg. Third joint of antennæ with a thin flat dilation near apex; antenniferous tubercles with a distinct spine above their base; form elongate, narrow. Tribe VI. CHARIESTERINI, p. 238
- ff. Antenniferous tubercles not prominent, the cheeks and tylus not strongly deflexed, the space between the tubercles filled; form oblong or elongate-oval. Tribe VIII. COREINI, p. 242.

Tribe I. ACANTHOCEPHALINI Stal, 1870, 149.

Elongate-oval pubescent species of large size, having the head subquadrate, not produced in front of antennæ, the tylus compressed to form a flattened plate which is projected upward between the antenniferous tubercles in the form of a triangular spine; basal joint of antennæ usually twice or more the length of head; ocelli inserted closer to eyes than to each other; beak not reaching hind coxæ; femora all armed beneath, the hind ones of male often much swollen; hind tibiæ strongly dilated on one or both sides.

This tribe, thus briefly characterized, comprises nine genera, all but one confined to Central and South America. Our single genus was by Uhler and other authors for many years called *Mctapodius* West. (1842, 4), but by Van Duzee and more recent writers this name is considered a synonym of *Acanthocephala* Lap.

I. ACANTHOCEPHALA Laporte, 1832, 29.

Elongate-oval species of large size and dull color having the head small, porrect, much shorter and narrower than middle of pronotum; tylus as in key; beak reaching or surpassing middle coxæ, joints 1, 2 and 4 subequal in length, 3 shorter; antennæ with first joint stout, somewhat curved, often twice or more the length of head, 2—4 more slender, third shortest; pronotum subhexagonal, wider at base than elytra, strongly declivent, much narrowed in front, the side margins straight, strongly converging from the prominent humeri to apex, which

is scarcely wider than head, their edges nodulate or bluntly toothed; scutellum small, triangular, nearly equilateral, its tip acute; corium with hind margin very long, oblique, strongly sinuate, its outer angle acute; membrane slightly surpassing tip of abdomen, its veins numerous, mostly forked; connexivum usually narrowly exposed; middle and hind coxæ well separated; hind tibiæ with large flattened dilations, the outer ones the longest and widest; osteolar opening large, with a short, curved exterior auricle.

Stal (1870, 149) recognized 23 species of the genus, mostly from Tropical America. Van Duzee (1917, 85) lists six from the United States, one of which is a synonym. Four of the remaining five occur in the eastern states.

KEY TO EASTERN SPECIES OF ACANTHOCEPHALA.

- a.* Humeri of pronotum broadly expanded and extending upward and outward much beyond basal margin of abdomen, thus causing the upper basal part of disk of pronotum to appear concave; outer dilation of hind tibiæ broad to almost the tip; length, 28 or more mm. 152. DECLIVIS.
- aa.* Humeri of pronotum but little expanded, not projected outward and upward, the disk therefore not appearing concave; outer dilation of hind tibiæ not wide at or near the apex.
- b.* Dilation of hind tibiæ extending nearly or quite to apex of tibiæ; size larger, length, 23 or more mm.
- c.* Pronotum with numerous small tubercles; antennæ reddish-brown throughout; hind femora of male much swollen, distinctly curved, the median tooth beneath long, stout, curved; outer dilation of hind tibiæ of male without distinct scallops. 153. FEMORATA.
- cc.* Pronotum granulated, without tubercles; joints 1—3 of antennæ brown, apical one reddish; hind femora of male slender, straight or nearly so, its median tooth not enlarged; outer dilation of male hind tibiæ with distinct scallops. 154. CONFRATERNA.
- bb.* Dilation of hind tibiæ reaching little more than two-thirds the length of tibiæ, deeply scalloped in both sexes; apical joint of antennæ paler than the others; length, 20—22 mm. 155. TERMINALIS.

152 (237). ACANTHOCEPHALA DECLIVIS (Say), 1832, 10; I, 305, 327.

Elongate-oval, very large for the genus. Dark brown, above evenly and rather thickly clothed with fine appressed yellowish hairs, beneath densely clothed with whitish ones; antennæ reddish-brown, the apical joint greenish-yellow; legs reddish-brown, the hind femora darker; tip of scutellum and incisures of connexivum yellow. Head across the eyes slightly wider than apex of pronotum; antennæ slender, basal joint but feebly curved, two and a half times as long as head, third joint two-

thirds the length of second, fourth nearly as long as first. Pronotum as in key, the basal portion across the humeri three times or more as wide as apex; front portion nearly perpendicular, sides from humeri to apex nearly straight, armed with eight or ten blunt teeth; disk with two small rounded glabrous nodules at middle of apical third and a few widely scattered smaller ones on basal half; humeri obtusely rounded, their hind margin with a few teeth. Connexivum narrowly exposed. Femora long, slender, the hind ones not greatly thickened, all armed beneath on apical half with 4 to 8 teeth. Hind tibiæ with outer dilation widest on basal third, then abruptly angularly narrowed and of equal width almost to apex; inner dilation very narrow basally, male, slightly wider, female, obsolete beyond the angulation of outer one, the inner margin finely toothed from there to apex. Other structural characters as in generic description. Length, 28—34 mm.; width, 11—12 mm.

Utopia, Lake Okeechobee and Dunedin, Fla., scarce, Dec. 21—March 4 (*W. S. B.*). Raleigh, N. Car., May 2 (*Brimley*). Recorded also from Chokoloskee, Fla., by Barber, and "Florida" by Uhler (1876, 297). Say's types were from Georgia and Louisiana and its known range extends from North Carolina and Florida, across these states to Texas, Arizona and Central America. My specimens were taken while beating the foliage of red bay, *Persca borbonia* L., along the margins of wet hammocks. Individuals of this and the next species are the largest of our Coreids and among the largest of our eastern terrestrial Heteroptera.

153 (238). ACANTHOCEPHALA FEMORATA (Fabricius), 1775, 708.

Elongate-oval, very robust, large for the genus. Dark chestnut or fuscous-brown, thickly clothed above and beneath with fine appressed yellowish hairs; membrane blackish-brown; tip of scutellum and incisures of connexivum greenish-yellow; legs fuscous-brown, the front and middle tibiæ and all the tarsi paler. Head oblong, narrow, convex; antennæ with basal joint stout, curved, nearly twice as long as head; second about one-fourth longer than third, fourth slender, a little shorter than first. Pronotum subhexagonal, with basal portion two and one-half times as wide as apex; humeri obtuse, sides thence to apex straight, armed with very small blunt teeth; disk with basal two-thirds convex and bearing numerous small rounded, widely scattered tubercles. Connexivum broadly exposed. Femora all rather stout, hind ones of male extremely so, curved, armed beneath with two rows of short tubercles or teeth, the median one of outer row long, curved, acute; hind femora of female more slender, the teeth on apical half of outer row regular and longer than those of male; the sides and upper surface of these femora in both sexes each with two rows of small tubercles. Hind tibiæ with outer dilation widest at base, in male gradually and evenly narrowed to apex; in female abruptly narrowed at basal two-fifths and again at

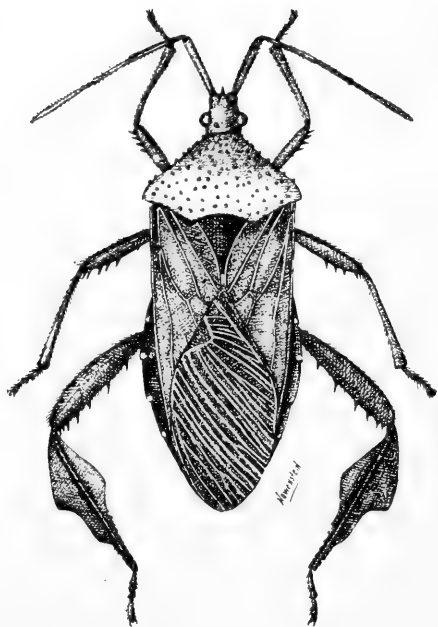


Fig. 43, female X 2. (After Lugger).

apical third; the inner dilation in both sexes confined to basal third, much the wider in female. Other characters as above given. Length, 25—28 mm.; width, 9—10 mm. (Fig. 43).

Ormond, Sanford, Sarasota, R. P. Park and Dunedin, Fla., Jan. 21—April 3 (*W. S. B.*). Agricultural College, Miss. (*W. C. C.*). About Dunedin it is taken frequently in early spring on the flowers of thistle and also swept from those of huckleberry and other low vegetation. Recorded by Van Duzee and Barber from numerous Florida stations and doubtless occurs in numbers throughout the State. Van Duzee (1909,

159) states that "it was not uncommon at most places where we collected. It was most abundant about 4 p. m., flying about weedy places in the bright sunlight; later in the evening they could be picked off the weeds and grasses where they were resting."

This is one of the largest and most ill-smelling of our "stink-bugs," and the collector can usually tell before seeing his capture that one is in umbrella or net. Its known range extends from North Carolina to Florida, Oklahoma, Texas and Mexico. Lugger (1900, 86) states that it is sometimes very common in Minnesota. Saunders (1883, 220) has recorded it as being injurious to cherries in the western states by puncturing the fruit and sucking the juices, but his specimens were perhaps erroneously determined. It varies much in size and in the thickness of the hind femora of the male, and old specimens are usually much darker than freshly matured ones. The *Rhinuchus nasulus* Say (I, 305) is a synonym.

154 (240). *ACANTHOCEPHALA CONFRATERNALIS* (Uhler), 1871, 99.

Elongate-oval, more narrow and less robust than *femorata*. Fuscous or chestnut-brown, thickly clothed with fine grayish or yellowish ap-

pressed hairs; antennæ chestnut-brown, the apical joint fulvous; femora dark reddish-brown or fuscous, the front and middle tibiæ and all the tarsi paler. Head as in *femorata*, the eyes smaller; basal joint of antennæ stout, feebly curved, third shortest, four-fifths the length of second, fourth longest, slightly longer than first. Pronotum much as in *femorata*, disk somewhat uneven, granulate, without distinct tubercles as there, its side margins subsinuate, armed with a few very small nodular teeth; humeri prominent, obtusely angled, their hind margin with a few nodules. Connexivum very narrowly exposed. Femora stout, armed beneath on apical two-thirds with two rows of teeth, hind ones of male nearly straight, swollen, but less so than in *femorata*, nodulate as there, with lower teeth more acute and more regular in size. Hind tibiæ of female dilated on both sides, of male only on the outer one, the dilation in both sexes angulate and narrowed at basal third, in female again at apical third; the inner side feebly toothed throughout its length in male, beyond the dilation which ends at middle, female. Length, 23—25 mm.; width, 9—10 mm.

Dunedin, Palmdale, Miami, R. P. Park, Ft. Myers and Sarasota, Fla., Feb. 9—April 4 (*W. S. B.*). Occurs on the foliage of shrubs along the margins of dense hammocks. When flushed it flies like a bird, often for several hundred feet. If marked down it can then be approached cautiously and taken by a quick sweep of the net. Mobile, Ala., March 3 (*Gerhard*). Barber records it from numerous stations along the east coast and central regions of Florida. Known only from Georgia, Alabama, Florida and Texas. Intermediate in size between *terminalis* and *femorata*. More apt to be confused with the latter, but easily distinguished by its narrower body, pale fourth joint of antennæ, lack of tubercles on pronotum and less swollen, more regularly toothed hind femora of male.

155 (242). ACANTHOCEPHALA TERMINALIS (Dallas), 1852, 431.

Elongate-oval, moderately robust, subdepressed above, convex beneath. Fuscous or dark chestnut-brown, thickly clothed above with yellowish appressed hairs, beneath with grayish ones; antennæ with basal joint fuscous, 2 and 3 reddish-brown, 4 reddish-yellow; tip of scutellum and incisures of connexivum yellowish; membrane dark brown; femora fuscous, middle and hind tibiæ and all the tarsi dull yellow, the apical joint of the latter fuscous. Head subquadrate, longer than wide, convex; antennæ as in *confraterna*; beak slightly surpassing middle coxæ. Pronotum subhexagonal, humeri prominent, obtusely rounded, sides feebly sinuate, minutely toothed, disk with numerous small rounded glabrous tubercles. Connexivum narrowly exposed. Femora slender, hind ones somewhat compressed, straight and not greatly enlarged in male, all armed beneath with two rows of small teeth. Hind tibiæ of

male with inner margin not dilated, but finely toothed, outer dilation widest at basal third, there angulate and narrowed, thence feebly sinuate and gradually evanescent, disappearing at apical third; of female with inner margin narrowly dilated on basal third, outer one more widely dilated than in male, the dilation narrowed at basal third then slightly widened, again strongly narrowed and obsolete beyond apical third. Length, 18—20 mm.; width, 6—7 mm.

Frequent throughout southern Indiana, April 26—Oct. 16; taken in Marshall County only in the north. Occurs for the most part on the foliage of various shrubs, trees and tall weeds along fence rows, woodland paths, margins of thickets and roadsides. In autumn it often occurs on the flowers of golden-rod, boneset and joe-pye-weed in low moist grounds. When approached it usually rises quickly and flies for some distance to a new resting place. This is the only known species of the genus in the northern states, ranging from New England to Colorado and south to Louisiana, Oklahoma and Texas. It has been recorded from Florida by Uhler and Van Duzee, but there is no definite station record from the State, though it perhaps occurs in the northern counties. While its known range is a wide one, it is nowhere so common as to be injurious. Uhler (1876, 298) says that "in Maryland, it occurs, sometimes in large numbers, on the branches of twigs and bushes along the borders of oak woods, in September and early October." The males are usually narrower and darker than the females, and freshly moulted specimens often have the antennæ concolorous throughout.

Uhler (1871, 98; 1878, 381) described from the Harris collection a *Metapodius instabilis* from Pennsylvania and North Carolina and states that the Pennsylvania specimen had been labelled "*Anisoscelis prominulus* Say Mss." by Say for Harris. Though Uhler does not mention this species in any of his subsequent papers or his Check List, Van Duzee includes it as No. 241 of his recent Catalogue. Uhler's description fits very well the *terminalis* of Dallas, and his name has, in my opinion, been properly placed as a synonym of that species by Gibson & Holdridge (1918, 240). It is unlikely that such a frequent and widely distributed undescribed species as *terminalis* was unknown to Say, but there is no published description in his works which agrees with it, and his manuscript name *prominulus* was therefore probably based on that species.

Tribe II. ANISOSCELINI Amyot & Serville, 1843, 217.

Species of medium size and elongate depressed form having the head elongate, convex, much prolonged in front of the insertion of antennæ; tylus longer than cheeks and deflexed in front of them, not compressed and elevated above them as in the preceding tribe; antennæ rather slender, surpassing the pronotum; beak reaching or surpassing hind coxæ; pronotum subhexagonal, its front portion strongly declivent, humeri prominent, acutely to obtusely angled; hind femora straight, stouter than the others, but not greatly swollen; hind tibiæ widely dilated, usually on both sides.

The tribe, as above characterized, comprises 11 genera, 8 of which are confined to Central and South America, representatives of the other three occurring in the United States, two of them in our territory.

KEY TO EASTERN GENERA OF ANISOSCELINI.

a. Second and third segments of antennæ dilated on both sides.

I. CHONDROCERA.

aa. Antennal segments not dilated, the basal joint usually equal to or slightly longer than the head.

II. LEPTOGLOSSUS.⁴⁰

I. CHONDROCERA Laporte, 1832, 44.

Elongate subdepressed species having the head porrect, longer than wide; cheeks wider than tylus, convex, their tips rounded; ocelli small, separated by a distance equal to that between them and eyes; pronotum with front portion strongly declivent, the sides straight and converging from the acute hind angles to apex, hind lobe also declivent, separated from front one by an obtuse carina; apical margin of corium very long, bisinuate; connexivum narrowly exposed; hind tibiæ with outer expansion angulate near middle, its front portion nearly three times as wide as inner expansion. One neotropical species occurs in Florida.

156 (243). CHONDROCERA LATICORNIS LaPorte, 1832, 45.

Elongate subparallel. Head and pronotum brownish-yellow; scutellum and elytra rather dark reddish-brown; membrane dark chestnut-brown; under surface and legs pale dull yellow, the expansions of tibiæ thickly sprinkled with reddish dots. Antennæ nearly as long as body,

⁴⁰Gibson and Holdridge (1918a, 3) in their "Key to Genera of Anisocelini" use "Basal joint of antennæ equal to length of head or slightly longer" as the one character distinguishing *Leptoglossus* from the other genera. In at least two of our eastern species, *fulvicornis* and *corculus*, this joint is distinctly shorter than head.

joints 1—3 reddish-brown, 1 much longer than head, triquetrous, distinctly curved; 2 and 3 dilated and triquetrous at middle, slender at each end, the edges of the dilated portions finely serrate; 4 paler, subfusiform, almost as long as 3. Pronotum finely, rather closely, unevenly reticulate-punctate; scutellum and elytra similarly but more coarsely punctate. Length, 16—18 mm.

Palm Beach, Fla., June 14 (*U. S. Nat. Mus.*). A West Indian species recorded in this country only from Palm Beach, Georgiana and Key Largo, Fla. Easily known by the peculiar form of antennal segments.

II. LEPTOGLOSSUS Guerin, 1838, 174.

Elongate, subdepressed species having the head long, porrect, prolonged and narrowed in front of the bases of antennæ; eyes large, globose; ocelli small, separated more widely from one another than from the eyes; antennæ with basal joint stout, curved, subclavate, usually about as long as head, thickly beset with short bristles, remaining joints more slender, the third usually the shortest; beak surpassing metasternum, joints 1, 2 and 4 subequal, 3 shorter; bucculæ short, narrow, located opposite base of antennæ; pronotum subhexagonal, widest across the humeri, the sides thence strongly converging to apex, which is less than half the greatest width, front portion strongly declivent, the angle of humeri variable as to species; scutellum triangular, about as broad at base as long; apex of corium very long, oblique, sinuate, its outer angle acute; membrane slightly surpassing the abdomen, its veins very numerous, many of them forked; connexivum usually widely exposed and reflexed, the dorsum thus concave beyond the middle of elytra; middle and hind coxæ widely separated; femora spined beneath, the hind ones moderately swollen, tuberculate above and on sides; dilations of hind tibiæ wide, their margins more or less scalloped; spiracles placed near the middle of the ends of the ventral segments.

The genus is a large one, 23 species being recognized by Stal (1870, 160) from North and South America. Nine are known from the United States, six from east of the Mississippi.⁴¹

KEY TO EASTERN SPECIES OF LEPTOGLOSSUS.

a. Pronotum coarsely rugosely punctate, its humeri very prominent,

⁴¹A single specimen of *Leptoglossus balteatus* (Fabr.), a Cuban species, labelled "Florida," is in the U. S. National Museum collection. It is probably an adventive individual as no other record of its occurrence in this country can be found.

- rounded, projected upward and outward; elytra without trace of pale markings. 157. FULVICORNIS.
- aa.* Pronotum finely and evenly punctate, its humeri much less prominent, but little projecting upward; elytra with narrow pale markings or cross band behind the middle.
- b.* Fourth joint of antennæ equal to or shorter than third; outer dilation of hind tibiæ not scalloped; beak reaching or passing middle of third ventral. 158. CORCULUS.
- bb.* Fourth joint of antennæ longer than third; outer dilation of hind tibiæ scalloped; beak not reaching third ventral.
- c.* Side margins of pronotum behind the humeri unarmed; elytra with a very small oblique pale spot on nervure opposite the base of membrane. 159. OPPOSITUS.
- cc.* Side margins of pronotum behind the humeri crenulate or toothed; elytra each with transverse orange or yellowish bar opposite the base of membrane.
- d.* Hind angle of pronotum ending in a prominent spine; pronotum with a curved transverse yellow line in front of middle. 160. GONAGRA.
- dd.* Hind angle of pronotum not spined; pronotum without pale curved line.
- e.* Pronotum widely margined with orange, the disk black; dilation of hind tibiæ confined to basal half; elytral cross-bar orange. 161. ASHMEADI.
- ee.* Pronotum without orange or pale margin; dilation of hind tibiæ reaching beyond middle; elytral cross-bar ivory-white. 162. PHYLLOPUS.

157 (249). LEPTOGLOSSUS FULVICORNIS (Westwood), II, 1842, 17.

Elongate-oval, subdepressed above, convex beneath. Above dark brown thinly clothed with fine appressed yellowish hairs; joints 2—4 of antennæ, tip of scutellum and incisures of connexivum dull yellow; under surface brownish-yellow sparsely mottled with very small fuscous dots, thickly clothed with short, prostrate yellowish pubescence; beak, front and middle legs and hind tibiæ beyond the dilation greenish-yellow; hind femora and basal half of tibiæ brown. Head very long, the triangular, front portion subacute, reaching beyond middle of basal joint of antennæ; beak reaching to or beyond middle of third ventral; antennæ with basal joint shorter than head, 2—4 very slender, second nearly one-half longer than third, slightly longer than fourth. Pronotum with basal half more than twice the width of apex; humeri broadly obtusely rounded, very prominent, projecting upward and beyond the sides of elytra much as in *Acanthocephala declivis* Say, their front and hind margins with short, bluntly rounded teeth; disk coarsely rugosely punctate. Hind tibiæ with dilation of inner and outer sides conjointly oval, the inner one more narrow, not extending beyond middle of tibiæ, its margin with three or four teeth; the outer wider and slightly longer with two small denticles in male, two wide scallops in female. Length, 21—25 mm.; width, 7—9 mm.

Dunedin, Fla., April 20 (*W. S. B.*). Wilmington, N. Car., July 25 (*Brimley*). Spring Hill, Ala., March 12 (*Gerhard*). My single specimen was taken while sweeping huckleberry and other low shrubs. This, our largest species, ranges from Massachusetts and New York west and southwest to Florida and Alabama, but is nowhere common. Single specimens only are known from Massachusetts and North Carolina, and the only record for Florida given by Barber, is that of *L. magnolia* Heid., a synonym, based on a Florida specimen in the National Museum.

158 (246). *LEPTOGLOSSUS CORCULUS* (Say), 1832, 12; I, 326.

Elongate-oval, subdepressed above, subconvex beneath. Dark reddish-brown, thinly clothed above, more thickly beneath, with fine appressed yellowish hairs; head fuscous with three narrow, often interrupted, reddish-brown lines; antennæ with joints 1 and 4 partly or wholly fuscous, 2 and 3 reddish-yellow; pronotum with irregular fuscous markings; apex of scutellum, incisures of connexivum and some short, zigzag lines on nervures of corium opposite base of membrane, dull yellow; under surface reddish-brown irregularly mottled with fuscous; legs reddish-brown, the front and middle tibiæ slightly paler. Head oblong, convex, the narrowed apical portion obtuse, not reaching middle of basal antennal joint; beak reaching fourth ventral; antennæ relatively short and stout, basal joint shorter than head, second one-half or more longer than third, which is slightly longer than fourth. Pronotum but little longer than head, humeri broadly rounded, their margins entire, disk with surface uneven, finely and densely punctate. Scutellum with numerous fine transverse ridges. Connexivum narrowly exposed. Hind femora but little swollen, its spines rather stout, acute, feebly curved. Hind tibiæ with dilations conjointly lanceolate, the outer one reaching almost to apex, its margin entire; the inner a little narrower and shorter, finely toothed on apical half. Length, 16—19 mm.; width, 4.5—6 mm.

Rockaway Beach, Long Island, May 14 (*Davis*). Raleigh and Southern Pines, N. Car., July—October (*Brimley*). Say's types were from the St. John's River, Fla., and it has been recorded from Ft. Myers and Miami, that State. While its known range extends from New York to California, it is mostly southern as, outside of New York, it has not been recorded in the east north of southwestern Pennsylvania and Tennessee, though known from Colorado, New Mexico and Arizona. Uhler (1876, 298) says that the western specimens are paler colored than those from the southeast and (1878, 383) that it is "remarkable for the unusual breadth of the humeral rounding and belongs to the group of species having the zigzag white band on disk of

corium." Brimley (1907, 440) reports having taken it near Raleigh on November 10 and again March 1, under a log, apparently hibernating.

159 (248). *LEPTOGLOSSUS OPPOSITUS* (Say), 1832, 12; I, 327.

Elongate-oval; subdepressed above, subconvex beneath. Dark reddish-brown, thickly clothed beneath with short silvery-gray pubescence, very thinly above with fine yellowish hairs; head fuscous, with three narrow paler lines; antennæ reddish-brown, the terminal joint a little paler; tip of scutellum, incisures of connexivum and usually a short dash on oblique nervure of corium, dull yellow; under surface and legs pale reddish-brown, the former mottled with numerous fuscous dots. Head as in *corculus*; antennæ longer and more slender, the basal joint about as long as head; second two-thirds longer than third, the latter shorter than fourth. Pronotum with humeri and side margins unarmed, the former obtusely angled; disk, as well as those of scutellum and elytra, finely and densely punctate. Hind femora relatively slender, their teeth shorter and more inclined



Fig. 44, X 2. (After Lugger).

than in *corculus*. Hind tibiae with dilations conjointly broadly oval, reaching but little beyond middle of tibiae, the inner more narrow and bearing a few teeth, the outer with two rather deep scallops. Length, 18–20 mm.; width, 5–6 mm. (Fig. 44).

Lake, Marion, Putnam, Vigo and Posey counties, Ind., scarce, April 26—Nov. 20; probably occurs sparingly throughout the State. Found in summer on foliage along borders of woods and thickets; in autumn on flowers of goldenrod and other Compositæ. Single specimens were picked up from sidewalks near the center of Indianapolis on Nov. 8 and 20. Dunedin and Ft. Myers, Fla., scarce, Dec. 15—March 4 (*W. S. B.*); swept from low shrubs. Recorded by Barber only from Lake Worth and probably very scarce throughout the State. One of the Dunedin specimens has the white mark on corium zigzagged as in *L. corculus* Say, to which it is very closely allied, but from which it is readily separated by the longer terminal joint of antennæ and shorter, scalloped dilations of hind tibiae.

This is our most common species in the North, its known range extending from New York and New Jersey west to northern Indiana and Minnesota, and southwest to Florida,

Oklahoma, Texas and Mexico. In economic entomological literature it is known as the "northern leaf-footed plant-bug," and Chittenden (1902, 18) states that in the north it at times becomes quite injurious to melons, squash and cucumbers and that it punctures and sucks the juices of apricots, pears, peaches and other fruits, causing them to become withered and bear scars and markings of injury. It also punctures corn in the milk and tomatoes and in the south is at times injurious to cotton. The eggs are laid in single rows along the stems or leaf ribs of the plants upon which the insects feed. They are bronze-brown and quite similar in structure to those of *Brochymena quadripustulata* (Fabr.), described on p. 99, the young emerging by pushing up a small circular lid or trap door. They hatch in about eight days and the nymphs, casting the skin four times, become adult in from four to five weeks. The wild food plant is as yet unknown, though Garman has taken the nymphs in numbers at Lexington, Ky., on adam's needle, *Yucca filamentosa* (L.).

160 (250). LEPTOGLOSSUS GONAGRA (Fabricius), 1775, 708.

Elongate, subparallel. Head reddish-yellow with four black stripes, two wide ones on middle, extending from base to apex and a narrower one each side of eye, the latter extending back onto pronotal flanks; pronotum with apical third reddish-brown, this hue bordered behind by a wide curved coarsely punctate yellow line, basal third dark brown to blackish; elytra dark reddish-brown, a small spot on each basal angle and tip of scutellum, basal third of each connexival and usually a cross-bar behind the commissure, dull yellow; membrane dark brown; front and middle legs with femora reddish-brown, blackish beneath, their tibiæ each with two yellow rings; hind legs blackish, the middle third of tibiæ in part yellow; under surface reddish-yellow with six narrow brown stripes; antennæ black, the middle of joint 2, basal half of 3 and apical half of 4 reddish-yellow. Hind femora subclavate, beset above with numerous tubercles, beneath with five or six triangular teeth; outer expansion of tibiæ with three smaller teeth, inner one irregularly serrate. Length, 16—18 mm.

Brownsville, Tex., Aug. 10 (*U. S. Nat. Mus.*). A neotropical species ranging from Florida south to Mexico, Brazil and Argentina. Recorded from Daytona and Cutler, Fla. Easily known by the curved pale cross-bar of pronotum and spines of the humeral angles. The cross-bar of elytra is often reduced to two small spots similar to those on corium in *oppositus*.

161 (251). *LEPTOGLOSSUS ASHMEADI* Heidemann, 1909, 237.

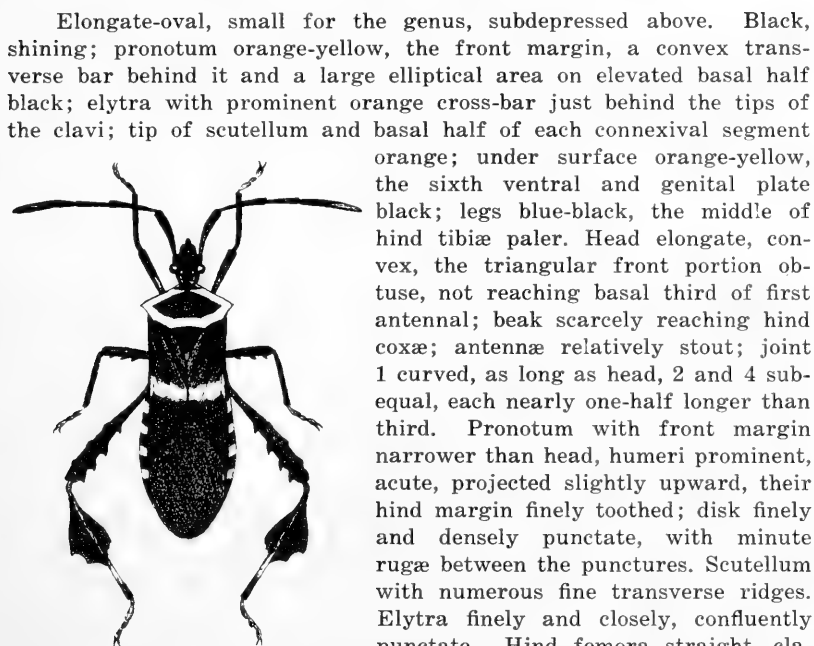


Fig. 45, X 3. (After Heidemann).

tubercles and teeth prominent. Dilations of hind tibiae as in *oppositus* but a little shorter. Length, 14–16 mm.; width, 5–6 mm. (Fig. 45).

Dunedin, Fla., April 1; eight adults and several nymphs beaten from a large bunch of mistletoe, *Phoradendron flavescens* (Pursh.), on an oak tree growing in dry sandy upland. Described from St. Nicholas, Fla., and taken by Van Duzee at Green Springs, these being the only recorded stations. None of my examples show the narrow orange stripes on head mentioned by Heidemann. An easily recognized and very handsome species.

162 (244). *LEPTOGLOSSUS PHYLLOPUS* (Linnæus), 1767, 731.

Size and form of *oppositus*. Above chestnut-brown, thinly clothed with very fine, short, appressed yellow hairs; three narrow stripes on head, and front side margins of pronotum, dull yellow; joints 1 and 4 of antennæ in part or wholly fuscous, 2 and 3 yellow; elytra with an ivory-white cross-bar opposite base of membrane; tip of scutellum, incisures of connexivum and several small spots on dilations of hind tibiae, whitish-yellow; under surface reddish-brown mottled with numerous blackish dots and thickly pubescent with short silvery-white hairs; legs

reddish-brown, the tibiæ with a broad yellowish ring at middle. Head three-fourths the length of pronotum, convex, the narrowed front portion obtuse, reaching basal third of first antennal; beak reaching first ventral;

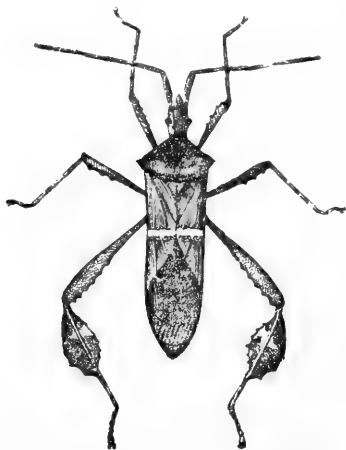


Fig. 46. X 2. (After Lugger).

antennæ with basal joint stout, curved, as long as head, 2 and 4 subequal, third shorter. Pronotum with humeri prominent, slightly projected upward, their tips subacute and hind margin feebly toothed; disk finely and densely punctate. Scutellum finely transversely wrinkled. Elytra closely, finely punctate. Connexivum very narrowly exposed. Hind femora slender, subclavate, the tubercles above and spines beneath relatively small. Hind tibiæ with dilations conjointly sublanceolate, the inner much the narrower, reaching middle of tibiæ, its margin finely toothed; the outer reaching apical third, its margin with two wide, rather shallow scallops. Length, 18—20 mm.; width, 5.5—6 mm. (Fig. 46).

Common throughout Florida; taken by me at nearly all collecting stations, Nov. 23—April 15. Occurs in numbers in spring in the axils of the leaves and on the heads of the yellow-flowered thistle, *Carduus spinossissimus* Walt. Ranges from Long Island, New York and Virginia south and southwest to Missouri, Oklahoma, Arizona and Central America. It is much more abundant in the southern states than is *L. oppositus* in the north, and has been recorded by Chittenden (1899, 47) as doing considerable damage to cotton bolls, cucurbs, potatoes, peaches, oranges and other fruits. Brimley (1907, 440) has taken it at Raleigh, N. Car., on yucca, asparagus and tomatoes. Girault (1906, 382) has given an interesting account of its methods of feeding on grapes. The *Anisoscelis albicinctus* Say (I, 326) is a synonym.

Tribe III. LEPTOSCELINI Stal, 1867, 545.

Elongate-oval species having the head porrect, a little shorter than or equal in length to pronotum, narrowed and produced forward between the bases of antennæ, cheeks not exceeding tylus; antennæ slender, half the length of body; beak surpassing hind coxæ, its first joint reaching base of head; bucculæ less than half the length of head; femora all armed be-

neath, the spines of front and middle ones very small; hind tibiæ simple.

Four genera are known from the Western Continent, two from the United States; of these one is represented by a single neotropical species in southern Florida.

I. PHTHIA Stal, 1862, 294.

Species of medium size, having the head wider across the eyes than front margin of pronotum, its narrowed front portion short, obtusely rounded; beak with joints 1 and 2 subequal, 4 longest, more than twice the length of 3; antennæ with first joint almost straight, as long as or slightly longer than head, 2 and 4 subequal, each about one-third longer than 3; pronotum subhexagonal, its front portion declivent and gradually narrowed from humeri to apex, the latter with submargin impressed to form a collar; scutellum small, nearly equilateral; elytra as in preceding tribes, the outer apical angle of corium scarcely reaching the middle of membrane, the latter slightly surpassing abdomen, its veins simple; femora slender, the hind ones passing the abdomen.

Six species are known from tropical America, but one of which extends northward into our territory.

163 (258). PHTHIA PICTA (Drury), 1770, 107.

Oblong-oval, depressed above, subconvex beneath. Above piceous or fuscous-brown, thickly clothed with fine short yellowish appressed hairs; a stripe on head behind each eye, the narrow side margins, and often two transverse bars on disk of pronotum, basal half of costal border of elytra and basal third of each connexival segment, reddish-yellow; antennæ piceous-black; under surface piceous or dull red sprinkled with piceous dots, thickly clothed with silvery-gray pubescence, the spiracles and some spots on sternal pleura reddish-yellow; legs piceous, the front and middle tibiæ with a yellow ring at apical third. Pronotum with side margins straight, finely toothed; humeri either subacute or subtruncate; disk finely and densely punctate. Elytra and scutellum similarly punctate. Spiracles equally distant from front and hind margins of ventral segments. Other characters as under generic heading. Length, 14—16 mm.; width, 4—5 mm.

Punta Gorda, Fla., Nov. 11, on *Solanum* (Davis). Victoria, Brazil (*VanDuzee*). Barber records it also from Big Pine Key, Miami and Biscayne Bay, Fla. Our Florida form is the color variety *dispar* (Fabr.). A neotropical species of wide distribution and, on account of its great variations in the color and pattern

of markings of pronotum, with numerous synonyms. Known in this country only from Florida, Texas and California. Uhler (1876, 299) says that, "In the fresh full-colored varieties, the bright orange bands of the pronotum contrast richly with the vivid steel-blue of the ground color."

Tribe IV. MICTINI Stal, 1867, 535.

Coreids of medium or large size and usually broadly oval form having the head short, broad, subquadrate, not produced forward between the bases of antennæ; beak short, stout, not reaching middle coxæ; tylus more or less compressed and deflexed between the antenniferous tubercles, the latter borne on or forming the upper front portion of the cheeks, the space between them rarely but little wider than the tubercles themselves; pronotum with front side margins usually distinctly toothed; femora, at least the hind ones, spined beneath.

The tribe is represented in tropical America by 20 or more genera, and in the United States by seven. Of these members of four are recorded from the eastern states.

KEY TO EASTERN GENERA OF MICTINI.

- a. Antenniferous tubercles without a spine on the outer side, the space between them filled by the convexity of tylus; head not tuberculate behind the eyes.
 - b. Truncate hind margin of pronotum not wider than base of scutellum; hind femora of males not strongly swollen.
 - c. Abdomen subrhomboidal, widely dilated opposite middle of elytra, the connexivum very broadly exposed. I. MOZENA, p. 228.
 - cc. Abdomen elongate-oval, but slightly widened opposite middle of elytra, the connexivum narrowly exposed. CAPANEUS.⁴²
 - bb. Truncate hind margin of pronotum distinctly wider than base of scutellum; hind femora of males strongly swollen.
 - II. ARCHIMERUS, p. 230.
- aa. Antenniferous tubercles spined on the outer side, the space between them vacant; head with a distinct tubercle behind each eye.
 - III. EUTHOCHTHA, p. 233.

I. MOZENA Amyot & Serville, 1843, 192.

Large, broadly oval depressed species having the head less than half the length of pronotum, subquadrate; tylus a little

⁴²While this genus is included in the key, the only species recorded from the eastern states is the *Lygaeus incubitor* Fabr. (1794, 136). It was described from "Carolina," was unknown to Stal (1870, 227) and is not at present represented in any collection in the United States. It is not, therefore, considered farther in this work. Two other species of the genus, described by Stal from Mexico, occur in the southwestern states.

longer than cheeks, compressed and deflexed between them; antennæ stout, basal joint feebly curved, slightly longer than head, 3 and 4 subequal, each about one-third shorter than 2, which is the longest; beak very short and stout, but slightly surpassing front coxæ, its joints subequal; bucculæ rather wide, half the length of head, their edges parallel; pronotum with front side margins strongly converging from humeri to apex, the latter less than one-third the greatest width, posterior side margins sinuate from tip of humeri to the subtruncate base, the latter not wider than scutellum, its lateral angles obsolete; prosternum grooved behind front coxæ, the groove with margins elevated, enclosing the tip of beak; femora short, stout, armed beneath with a few short teeth, the hind ones moderately swollen, their tips in female scarcely reaching fifth ventral; tibiæ longer than femora, the hind ones feebly toothed beneath; spiracles placed nearer the front than hind margins of ventral segments.

About a dozen species have been described from Tropical America, five of which range northward into our southwestern states. Our single eastern species belongs to the subgenus *Rhombogaster* Dallas (1852, 379), characterized mainly by its widely inflated subrhomboidal abdomen.

164 (266). MOZENA OBESA Montandon, 1899, 190.

Elongate or broadly oval, widest behind the middle of abdomen. Dark reddish-brown; head and pronotum clouded with fuscous; antennæ fuscous-brown; connexivum fuscous, its incisures in part paler; membrane seal-brown the narrow tip yellowish-hyaline; abdomen with sides fuscous, the middle reddish-brown clouded with fuscous; sternal pleura uniform reddish-brown; legs fuscous-brown. Pronotum with front side margins sinuate, or subconcave, armed with short, bluntly rounded teeth; humeri prominent, prolonged outward and a little upward, their tips subacute; disk densely finely rugose, the punctures between the rugæ each enclosing a minute, white hair-like scale. Scutellum transverse'y rugose and coarsely punctate. Elytra more finely and sparsely punctate, the punctures each with a white scale. Abdomen widely inflated, the connexivum broadly exposed and reflexed, the dorsum therefore appearing deeply concave. Other characters as under generic heading. Length, 20—22 mm.; width, 7—8.5 mm.

Lakeland, Fla., March 2, beaten from bunches of Spanish moss (*W. S. B.*). Described from "Florida" and listed by Barber from Jacksonville and Enterprise. Not recorded outside of that State.

II. ARCHIMERUS Burmeister, 1835, 321.

Oblong-oval species of medium size having the head subquadrate, about as wide as long; tylus slightly longer than cheeks, deflexed and filling the space between the bases of antennæ; beak reaching middle of mesosternum, joints 1, 2 and 4 subequal, 3 shorter; bucculæ short, wide, their margins rounded; antennæ short, the basal joint stout, feebly curved, twice as long as head; 2—4 more slender, the second one-half longer than third, the latter equal to or a little shorter than fourth, all strongly beset with bristly hairs; pronotum subhexagonal, the apex less than half the greatest width, the posterior side margins sinuate, forming a distinct angle with the squarely truncate base, the latter wider than scutellum; connexivum widely exposed; membrane scarcely reaching tip of abdomen, its veins numerous, crowded, mostly forked; front femora armed beneath near apex with two prominent spines; hind ones of male strongly swollen, armed beneath with several large spines; hind tibiæ of female slender, cylindrical, feebly spined beneath; of male, stouter, somewhat compressed, curved at middle and there armed beneath with two very stout spines, beyond these to apex with numerous smaller ones; spiracles placed near the front margins of the ventrals. Genital plate of males elliptical, convex, almost vertical.

Six species are known, four from the United States, three of which have been recorded from our territory.

KEY TO EASTERN SPECIES OF ARCHIMERUS.

- a.* Antennæ stout, less than half the length of body.
- b.* Connexivum uniform reddish-brown; femora without erect bristly hairs. 165. CALCARATOR.
- bb.* Connexivum distinctly alternated throughout with yellow and fuscous spots; femora with numerous erect blackish bristly hairs. 166. ALTERNATUS.
- aa.* Antennæ more slender, slightly more than half the length of body; front angles of second and third connexivals only with a small pale spot. 167. ASHMEADI.

165 (270). ARCHIMERUS CALCARATOR (Fabricius), 1803, 192.

Elongate-oval, subdepressed, widest behind middle of abdomen. Pale reddish-brown throughout, the membrane slightly darker; very thinly pubescent with short scale-like silvery gray hairs. Head broader across the eyes than long; beak slender, but slightly surpassing front coxæ, its first joint nearly twice the length of bucculæ, the latter short, oval. Pro-

notum subhexagonal, front side margins feebly sinuate, armed with very short blunt teeth; humeri prominent, broadly rounded, their margins entire; disk with a vague longitudinal median impression, the basal two-thirds densely rather coarsely punctate, with fine transverse rugæ between the punctures. Scutellum with similar sculpture. Elytra finely, sparsely irregularly punctate. Abdomen rather widely inflated, the connexivum broadly exposed and reflexed. Hind femora of female rather slender, armed beneath with two rows of short tubercle-like teeth; of male strongly swollen without bristly hairs and with very minute tubercles above, the median tooth on inner edge of lower surface much longer and stouter than the others. Hind tibiæ compressed, those of female straight, armed beneath with numerous short teeth; of male as described under generic heading. Length, 18—21 mm.; width, 6—7.5 mm.

Sanford and Dunedin, Fla., Nov. 29—April 12. Recorded from numerous stations in Florida and probably occurs throughout the State. About Dunedin it hibernates beneath piles of weeds and other cover and in spring occurs especially on flowers of the dwarf papaw, *Asimina parviflora* Michx., and other low shrubs. The females are much the more numerous. One of them, taken in November, has the margins of pronotum and sides of abdomen tinged with fuscous. The membrane has a very handsome silken-bronzed lustre. Described from "Carolina" and correctly recorded since only from Florida, though doubtless of wider range in the southern states.

166 (271). *ARCHIMERUS ALTERNATUS*
(Say), 1825, 317; II, 243.

Form and size of *A. calcarator*. Dull clay-yellow, marked with fuscous punctures; membrane fuscous-brown; antennæ and femora tinged with fuscous; connexivum fuscous or dark brown, the basal third of each segment dull yellow. Beak a little longer than in *calcarator*, reaching middle of mesosternum; bucculæ longer and narrower than there. Antennæ with basal joint stouter, equal in length to joint 2, 3 and 4 shorter, subequal. Pronotum as in *calcarator*, the disk without transverse rugæ as there, but with the larger punctures sparsely unevenly placed, each surrounded by a feebly calloused ring. Hind femora of male a little shorter, more swollen, its upper side with bristly hairs and more prominent

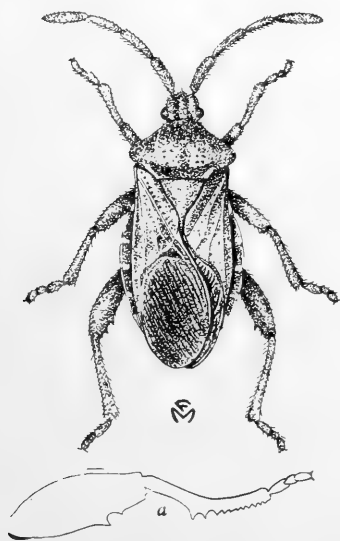


Fig. 47, male X 2. α, hind leg.
(Original).

tubercles; of female with teeth below fewer, the two or three on apical third of each margin longer and stouter than those preceding. Length, 16—21 mm.; width, 6—7 mm. (Fig. 47).

Vigo, Lawrence and Crawford counties, Ind., scarce, April 9—Sept. 18; R. P. Park, Fla., March 26 (*W. S. B.*). Not before recorded from the latter State. Occurs on foliage of blackberry and other shrubs along wooded hillsides and borders of thickets. One just emerged as adult was taken April 19 on a red oak tree. Ranges from New Jersey and North Carolina south to Florida and west to Colorado and Oklahoma. It appears to be nowhere common and nothing regarding its food habits has been published.

Stal (1870, 137) erroneously made this species a synonym of *calcarator* (Fabr.). In this he was followed by Uhler and other American authors until Van Duzee (1909, 159) pointed out in part the differences between the two. This author stated, however, that *calcarator* is smaller than *alternatus*. That is true only of the males, and the difference in size is not great in that sex. All Indiana females of *alternatus* are a little shorter with body distinctly narrower and abdomen less inflated than in Florida females of *calcarator*. The two species are easily separated by the characters given above in key and in the description of *alternatus*.

167 (273). ARCHIMERUS ASHMEADI Montandon, 1899, 194.

"Dull brownish-yellow tinged with clear brown. Antennæ rather slender, slightly more than half the length of body, joints 1—3 clothed with fine silken hairs, 1 and 2 subequal, 3 two-thirds the length of 2, 4 slightly paler, about as long as 2. Pronotum with front side margins straight, their apical two-thirds with small tubercles, lateral angles well rounded, projecting outward beyond sides of base of scutellum; basal margin truncate in front of scutellum; disk with impressed punctures darker, the intervals between them smooth and calloused. Scutellum rather sparsely punctate. Elytral punctures dark, deeper and coarser on clavus, those of corium more sparse, each surrounded by a small smooth area; membrane shining, concolorous with corium. Abdomen well rounded, distinctly wider than pronotum; front angles of connexivals 2 and 3 with a small pale spot, hind angles of 4 and 5 ending in a minute spine. Male with hind femora thickened, with three small tubercles on upper surface and two rows of small spines beneath; tibiæ curved and with a rather large tooth near middle, the apical half serrate within. Female with hind femora but slightly swollen, toothed beneath, tibiæ straight without teeth. Head, front of pronotum, sternum and legs clothed with a short grayish pubescence. Length, 19.5—20 mm.; width of pronotum, 6.5—6.8 mm.; of abdomen, 8.8—9.3 mm."

The preceding is a free translation of the original description of Montandon. His types were from Florida and of them he said: "Received from W. H. Ashmead under the name of *A. calcarator* Fab. to which they are related in general form but besides the very notable difference in color, they differ by the antennæ, which are plainly longer and more slender."

III. EUTHOCHTHA Mayr, 1865, 431.

Elongate-oval species of medium size having the head short, subquadrate, broader across the eyes than the apex of pronotum; antenniferous tubercles prominent, extending much beyond the tylus, the space between them, therefore, emarginate or unfilled, armed on the outer side with a small blunt spine; antennæ slender, the basal joint but little swollen, twice as long as head, 2 and 3 more slender, the second the longer, 4 stouter, fusiform, bristly, slightly shorter than 3; beak reaching middle coxæ, joints 2 and 4 subequal, basal joint longer, twice the length of bucculæ; pronotum with front angles produced as a short tooth, front side margins armed with small tubercles or blunt teeth, truncate basal margin wider than scutellum, its lateral angles obtuse; connexivum widely exposed, more so in female, where the hind angles of its last two segments are prolonged and the last dorsal deeply and widely emarginate, the tip of abdomen in that sex therefore appearing serrate; membrane reaching tip of abdomen, its veins in part anastomosing, in part forked; femora all armed beneath, the hind ones of male curved, moderately swollen, tuberculate above; tibiæ simple, straight in both sexes; spiracles placed nearer the front than hind margins of ventral segments. One species is known.

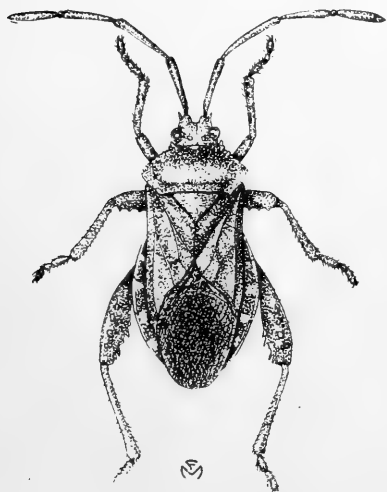


Fig. 48, male X $2\frac{1}{2}$. (Original).

168 (276). EUTHOCHTHA GALEATOR (Fabricius), 1803, 191.

Elongate-oval, depressed above, subconvex beneath. Above dull clay-yellow or reddish-brown, thickly marked with fuscous punctures; antennæ reddish-brown or dull yellow, the terminal joint darker; connexi-

vum reddish-brown, the margins of segments fuscous, irregularly mottled with yellow; membrane seal-brown or fuscous-brown; under surface and legs clay-yellow or reddish-brown, sprinkled with fuscous dots, the hind tibiæ paler, immaculate. Pronotum with humeri prominent, rounded, their margins crenulate; disk finely, unevenly not densely punctate. Scutellum finely transversely rugose. Elytra punctate like pronotum, each puncture enclosing a minute yellowish scale. Other characters as above given. Length, 15—17 mm.; width, 5—6.5 mm. (Fig. 48).

Frequent throughout Indiana, more so in the southern counties, April 10—Oct. 1. Occurs in summer and autumn on the foliage of shrubs and leaves along the slopes of hills and borders of thickets and roadsides. One was taken April 10 from beneath a log on the margin of a sandy cultivated field, so that it may hibernate as imago. Occurs throughout Florida, having been taken by me at all collecting stations except Cape Sable, Key West and Chokoloskee, and listed from numerous others. About Dunedin it occurs in spring most frequently on sedges and weeds along the margins of lakes and ponds. The Florida specimens are more reddish-brown, less mottled with fuscous and with membrane paler than those from Indiana, the ground color of the latter being dull clay-yellow, the membrane dark fuscous-brown. Its known range is from New England west to Wisconsin and Illinois, south and southwest to Florida, Kansas and Texas. Nothing regarding its native food plants can be found in available literature.

Tribe V. MENENOTINI Bergroth, 1913b, 147.

Large broadly oval or elongate oval species having the head quadrate, wider than long; cheeks and tylus equal, abruptly strongly deflexed; antenniferous tubercles prominent, without spine at sides, the space between them narrow, unfilled; beak short, but slightly surpassing front coxæ; abdomen more or less inflated, the connexivum widely exposed and reflexed, the dorsum therefore appearing strongly concave; legs short, slender, all the femora and tibiæ unarmed; hind coxæ separated by a space equal to their distance from the margins of the body.

Since the genus *Mencnotus* Laporte (1832, 42) is the oldest of the five genera belonging to the tribe, the tribal name, as pointed out by Bergroth, should be that above given, not *Corecorini* as used by Van Duzee (1917, 97). Two of the genera are represented in our territory.

KEY TO EASTERN GENERA OF MENENOTINI.

- a.* Veins of membrane distinctly and irregularly anastomosing; pronotum with disk subdepressed, the humeri prominent and reflexed or projected upward; abdomen very widely inflated, the body widest behind the middle. I. CORECORIS, p. 235.
- aa.* Veins of membrane forked, not anastomosing; pronotum with disk convex, the humeri not prominent or reflexed; abdomen much less inflated, the body elongate-oval. II. SEPHINA, p. 236.

I. CORECORIS Hahn, 1834, 14.

Large, broadly oval depressed species, having the body widest behind the middle; antennæ less than half the length of body, the basal joint curved, fourth not longer than third; bucculæ very wide, their margins overlapping above basal joint of beak; pronotum with disk uneven, humeri prominent, rounded, prolonged outward and a little upward, front side margins sinuate, their edge uneven but not dentate, posterior side margins rounded into the subtruncate base; abdomen widely dilated with sides broadly rounded and reflexed; elytra much narrower than abdomen; membrane reaching the tip of the latter; metasternal pleura with hind margin broadly rounded. Other characters as under tribal heading.

About a dozen nominal species are known, all from tropical America, two of which are recorded from the United States and our territory. They have in the past been mostly recorded under the generic name *Spartocera* Lap.

KEY TO EASTERN SPECIES OF CORECORIS.

- a.* Antennæ more slender, reaching behind base of pronotum, the first joint distinctly longer than head; joints 2—4 subequal. 169. FUSCUS.
- aa.* Antennæ shorter, more swollen, scarcely reaching base of pronotum, the first joint but little longer than head; joints 2 and 3 subequal, 4 one-third shorter. 170. DIFFUSUS.

169 (277). CORECORIS FUSCUS (Thunberg), 1783, 44.

Broadly oval, depressed above, subconvex beneath, widest behind the middle of abdomen. Above dull clay-yellow or brownish-yellow; antennæ black or fuscous; pronotum with apex and front side margins fuscous, disk with two rather wide black lines converging and uniting in front; base of scutellum often blackish; connexivum alternated with black and reddish yellow, in old specimens often vaguely so; under surface black mottled with reddish-yellow; legs blackish, the coxæ and knees reddish-yellow. Structural characters as in key and under generic heading. Length, 20—24 mm.; width, 6.5—8 mm.

Dunedin, Gulfport, Sarasota, Ft. Myers and Lake Okeechobee, Fla., Nov. 17—July 22; Orizaba, Mexico, Aug. 1 (*W.*

S. B.). Recorded from numerous stations in southern Florida and as far north as Lake City. Found on weeds and fences in or about gardens or margins of orange groves and cultivated fields; also beneath rubbish. Known in this country only from Florida, Arizona and California. Stal (1870, 174) made Say's *Coreus confluentus*, described (1832, 11) from Mexico, a synonym of *fuscus*, but Van Duzee (1909, 159) dissented, stating that "it is sufficiently distinct to be given specific rank," but not giving any separating characters. Specimens from Orizaba, Mexico, named *fuscus* for me by Uhler, show no structural differences separating them from what has been called *C. confluentus* from Florida. Barber (1923a, 18) gives it as his opinion that the two are the same and they are therefore combined under the older name.

170 (278). CORECORIS DIFFUSUS (Say), 1832, 11; I, 325.

Broadly oval, depressed above, convex beneath, widest behind the middle. Dark brown or fuscous; scutellum in part or wholly blackish; elytra dull brownish-yellow; connexivum reddish-brown or paler, the upper basal angle of each segment darker; under surface in great part fuscous, the margins of abdomen and propleura sometimes dull reddish-yellow; antennæ, beak and legs fuscous-black, the coxæ and base of femora often paler. Antennæ as described in key, the joints very hairy. Pronotum with front half strongly declivent, its side margins straight or nearly so, their edge roughened; humeri very broadly rounded, their margins entire; disk with more or less matted pubescence and fine transverse rugæ almost concealing the small scattered punctures. Abdomen widely dilated, the connexivum very broadly exposed. Length, 17—20 mm.; width, 7—8 mm.

Southern Pines, N. Car., July 6—Sept. 7 (*Brimley*). Described from Savannah, Ga., its known range extending from North Carolina to Texas and New Mexico. Uhler and Van Duzee have recorded it from Florida without definite station. Uhler wrongfully placed it as a synonym of *C. cinnamomeus* Hahn (1833, 15), a Brazilian species. *C. diffusus* is easily distinguished from *fuscus* by its darker color, lack of black lines on pronotum, different relative lengths of antennal joints and straight sides of front half of pronotum, the humeri being less projected upward.

II. SEPHINA Amyot & Serville, 1843, 185.

Elongate-oval species of medium size, having the head very short, convex; beak reaching nearly to middle coxæ; bucculæ

short, wide, not overlapping base of beak; antennæ nearly half the length of body, joints 1, 2 and 4 subequal, 3 shortest; pronotum convex, its disk with a median lengthwise impressed line; abdomen with sides subparallel, not suddenly widely inflated, the connexivum rather widely exposed; membrane as in generic key; hind margin of metasternal plate straight. Female with median and lateral apical genital plates large, subequal, porrect, acute, and in connection with acute angles of sixth ventral, giving the tip of abdomen a strongly serrated appearance. Genital plate of male broadly scoop-shaped. Other characters as under tribal heading.

Nine nominal species are recorded by Stal (1870, 177) from tropical America, and three by Van Duzee from the United States. Of these he lists two from Florida, one of these, *S. gundlachi* (Guer.), a Cuban species, only on the "Fla." record of the Banks Catalogue. No definite accurate record of its occurrence in Florida can be found, and it is therefore not herewith included.

171 (281). *SEPHINA GRAYI* Van Duzee, 1909a, 232.

Elongate-oval, depressed above, convex beneath. Color orange-yellow and black. Head black with an oblique line behind each eye, yellow; antennæ, a large median semicircular spot on basal half of pronotum, extreme tips of humeri, scutellum, membrane and a rounded spot on each connexival segment, black; elsewhere above orange-yellow; under surface orange-yellow, the pleura each with a large black spot, that of propleura circular, the others subquadrate, prolonged within; ventrals each with a subcircular black spot near each basal angle and opposite these, within, a larger irregular one prolonged toward middle along the base of the segment; beak and legs, genital plate of male and basal genital plates of female, black. Pronotum very finely and densely punctate, the black spot on base with scattered coarse punctures intermingled with the fine ones. Scutellum and elytra finely and densely punctate, each fine puncture of the upper surface bearing a minute erect hair. Other structural characters as under generic heading. Length, 16—18 mm.; width, 6—7 mm.

Dunedin, Fla., Jan. 20—April 6. On the former date 44 adults and two nymphs were beaten from a large mass of the dead stems of the slender twining milkweed, *Mctastelma scoparium* Nutt., near the margin of a wet densely wooded hammock and it has since been taken on several occasions from the same plant. On the latter date three were beaten from elder near the same place. Described from "Florida," and recorded by Barber from Miami and Georgiana. Not known outside of that

State. Of it Van Duzee (loc. cit.) says: "This large showy insect seems to be strictly intermediate between *dorsalis* White and *gundlachi* Guer. From the former it differs most conspicuously by the alternated connexivum and from the latter by the unicolorous corium."

Tribe VI. CHARIESTERINI Stal, 1867, 546.

Slender elongate species having the head short, quadrate; antenniferous tubercles prominent, spined above, the spines oblique, acute on inner side; antennæ with first joint stout, feebly curved, usually thickened toward apex, third joint widely dilated; pronotum with humeri prominent, spinose; hind coxæ separated by a space more narrow than that between them and sides; femora all armed beneath near apex with a short spine; tibiæ slender, simple. The tribe comprises three genera, two confined to tropical America, the other represented in the United States.

I. CHARIESTERUS Laporte, 1832, 44.

Elongate slender-bodied species possessing the characters of the tribe and having the head without a tubercle behind the eyes; antenniferous tubercles subcontiguous, their spines converging, obliquely truncate and acuminate; first joint of antennæ of nearly equal thickness throughout, somewhat three-sided, the edges of basal half dentate; beak reaching middle coxæ, its joints subequal, the basal one stoutest; bucculæ short, wide, subtriangular; pronotum with front margin not impressed behind to form a collar, its side margins dentate and humeri with short spine; membrane reaching tip of abdomen, its veins rather few, forked and irregularly anastomosing; connexivum narrowly exposed; meso- and metasterna rather deeply sulcate; genital plate of male scoop-shaped.

Six species are known, three from the United States, one of which occurs in our territory.

172 (283). CHARIESTERUS ANTENNATOR (Fabricius), 1803, 198.

Elongate, slender, depressed above, subconvex beneath. Dark brown, thinly clothed with short appressed brownish-yellow hairs, in fresh specimens more densely beneath with a whitish bloom; dilation of third antennal, spines along edges of pronotum, margins of abdomen, beak and tarsi, fuscous. Antennæ with basal joint twice or more the length of head, second one-third shorter, third with apical half dilated to



Fig. 49, X 3. (Original).

form a thin oval plate, fourth fusi-form, shortest. Pronotum strongly declivent, its apex one-half the width of base; humeri with front and hind margins toothed, the tip ending in a short acute spine; posterior side margins smooth, basal one feebly concave. Length, 11—14 mm.; width, 3—4 mm. (Fig. 49).

Found throughout Indiana but nowhere common; April 5—Nov. 5. Occurs usually singly on flowers and foliage of jersey-tea, milkweed and various plants along fence rows, margins of thickets and roadsides. On Sept. 29 it was once taken in some numbers from tall grass and

dwarf willows along the edges of a wet prairie in Vigo County. Dunedin, Caxambus and Cape Sable, Fla., Nov. 19—March 21. At Cape Sable it was taken in March by sweeping herbage in a cocoanut grove near the edge of the ocean beach; while about Dunedin it occurs in spring on low shrubs in open pine woods. It is recorded from a dozen or so stations in southern Florida and probably occurs sparingly throughout the State. The specimens from Cape Sable and other points are smaller, darker, the sides of pronotum with fewer denticles and the humeral spine slightly longer than those from Indiana, and perhaps indicate a southern race. The nymph of the last instar is a very curious echinose creature; the head, pronotum and margins of the entire body being armed with numerous long forked or serrate spines.

The known range of *C. antennator* extends from Staten Island, New York and New Jersey, west to Michigan and Colorado and south and southwest to Florida, Oklahoma and Texas. The types of Fabricius were from "Carolina" and he mistook the antenniferous tubercles for joints and described the second joint of antennæ as being scabrous and the fourth as clavi-form. This caused Say (I, 323) to describe it anew as *Gonocerus dubius*, a synonym. Uhler (1877, 405) says that: "It often occurs upon bushes in the Atlantic region in localities adjoining open woods, and about groves of trees in the low meadows.

When fresh and not weather-beaten it is thickly powdered beneath with a white mealy substance. Occasionally it occurs upon goldenrod, in the pollen and flowers of which it deeply buries itself so as to be almost out of sight." Ashmead (1895, 320) found it common near Utica, Miss., in the cotton fields where it was feeding on the juices of the plant. He describes the egg as triquetrous, of a golden-bronze color with fine hexagonal reticulations and 1 mm. in length. This is the only mention found of its being injurious to plant life. In the sand regions of northwestern Illinois Hart found it frequently in August on the flowering spurge, *Euphorbia corollata* L. It and *Chondrocerca laticornis* Lap. are the only ones of our eastern Heteroptera having one or more of the antennal joints widely dilated.

Tribe VII. CHELINIDINI tribus nov.

Oblong-oval species of medium size having the head subcylindrical, porrect, three-fourths or more the length of pronotum, narrowed and produced forward in front of bases of antennæ, not calloused behind the eyes; cheeks porrect, shorter than tylus, their tips subconical or subacute, tylus strongly deflexed between them; antenniferous tubercles small, widely separated; antennæ stout, reaching apex of scutellum, basal joint swollen, curved, subclavate, half the length of head, 2 and 3 triquetrous, subequal, fourth shortest, fusiform; beak reaching or surpassing hind coxæ; femora all armed beneath on apical half; tibiæ simple, three-sided; spiracles equally distant from the apical and front and hind margins of the ventrals.

Stal (1870, 180), followed by Van Duzee in his Catalogue, has placed the genus *Chelinidea* Uhler under the tribe Coreini, but it does not run there by Stal's key in his Bidrag, and the elongated head, porrect cheeks, armed femora and triquetrous second and third antennal joints and tibiæ preclude its belonging there. I have therefore founded for it a new tribe.

I. CHELINIDEA Uhler, 1863a, 365.

In addition to the tribal characters above set forth, the species of this genus have the ocelli separated by a space greater than that between them and the eyes; bucculæ about one-third the length of basal joint of beak, their margin

rounded and acute behind; beak with joint 1 stout, slightly longer than head, 2 as long as 3 and 4 united, the third shortest; pronotum subhexagonal, the posterior side margin ill defined, rounding into the subtruncate basal margin, humeri rounded, not prominent, front side margins feebly sinuate, entire, their edges reflexed; corium with veins prominent, the median one forked; membrane a little shorter than abdomen, its veins numerous, mostly simple, a few forked; connexivum broadly exposed; hind femora thickened, subclavate, armed beneath on apical half with two rows of short spines; sixth ventral in female broadly and deeply emarginate, the basal plates of genital segment very large, wholly covering the median one; genital plate of male scoop-shaped.

Two species are known, one occurring in our territory, the other in the southwestern states.

173 (288). CHELINIDEA VITTIGER Uhler, 1863a, 366.

Oblong-oval, depressed above, subconvex beneath. Bright clay-yellow, glabrous; head, and antennæ brownish-fuscous, the former with a rather broad median yellowish stripe; front and basal margins of pronotum, scutellum usually and membrane, fuscous-brown or darker; elytra dull yellow, thickly marked with fuscous punctures, the basal half of costal margin and veins yellow; connexivum yellow, immaculate; under surface uniform yellow; legs and joints 2—4 of beak blackish-brown, basal joint of beak dusky yellow. Head with postocular spine reduced to a blunt tubercle. Pronotum finely and densely granulate-punctate, the humeral angles lower than the intervening parts and with a slight tubercle within; disk somewhat uneven, the apex about one-half the greatest width. Scutellum finely transversely wrinkled and granulate-punctate. Elytra finely rather closely and evenly punctate. Front and middle femora each with two or three short spines on the inner lower margin near apex, and one or two on the outer. Length, 13—15 mm.; width, 5—5.5 mm.

Southern Pines, N. Car., September—December (*Brimley*). Ranges in the east from Virginia southwest to Georgia and Louisiana; in the west from Colorado and Texas to Arizona and California. Recorded from Quebec by Provancher (1886, 55), but the single specimen taken was probably adventive. Uhler (1872, 401) says that in Texas "it infests a species of prickly-pear, *Opuntia*, sometimes in considerable numbers," and it has been taken in Colorado and New Mexico from the same plants. The color of the elytra varies considerably, due to the greater or less density of the fuscous punctures. McAtee (1919, 12) has given our eastern form a quadrinomial name, viz., *C. v. æquoris*, var. *artuatra*.

Tribe VIII. COREINI Stal, 1867, 547.

Oblong-oval or elongate species of small or medium size having the head subquadrate or subtriangular, porrect, less than half the length of pronotum, narrowed and produced a little forward in front of bases of antennæ; tylus equalling or slightly surpassing cheeks and with them more or less declivent or deflexed between the antenniferous tubercles, the latter well separated, not prominent; antennæ slender, joints 2 and 3 cylindrical, 4 shortest; beak slender, not reaching hind coxæ, joints 1, 2 and 4 subequal, 3 shorter; pronotum subhexagonal, its margins usually entire; legs slender, the femora usually unarmed; tibiæ simple, cylindrical; spiracles usually nearly equally distant from the apical and hind margins of the ventral segments.

Stal (1867, 547) included under his *Corcida* (*Coreini*) 20 American genera and one has since been founded by Uhler. Of these Van Duzee recognized 11 from the United States, and also wrongfully included with them *Chelini* Uhler, separated above. Of the 11, five are represented in the eastern states.

KEY TO EASTERN GENERA OF COREINI.

- a. Hind femora armed beneath with several spines; body elongate; legs very short, the hind femora not surpassing the fourth ventral.

I. NAMACUS, p. 243.

- aa. Hind femora unarmed;⁴³ body oblong or oblong-oval; legs longer, the hind femora passing the fourth ventral.

- b. Veins of the membrane very fine and numerous, everywhere irregularly anastomosing; tylus elevated and compressed above the cheeks to form a keel between the bases of antennæ; length, 9—11 mm.

II. MARGUS, p. 243.

- bb. Veins of the membrane fewer, much coarser, simple or a little forked; tylus not elevated and compressed above the cheeks.

- c. Beak almost reaching or surpassing middle coxæ, its first joint extending beyond hind border of eyes; front side margins of pronotum entire or nearly so.

- d. Head very broad, subdepressed, the eyes projecting outward distinctly beyond apical angle of pronotum; ocelli separated by a space nearly twice that between them and the eyes; spiracles placed nearer the side margins of ventrals than from either the front or hind margins; smaller, not over 12 mm.

III. CATORHINTHA, p. 244.

- dd. Head narrower and more convex, the eyes not or but slightly projected outward beyond apical angle of pronotum; ocelli separated by a space about equal to that between them and

⁴³Except rarely in *Anasa*.

eyes; spiracles equally distant from side, front and hind margins of ventrals; larger, 13 or more mm. IV. *ANASA*, p. 248. cc. Beak scarcely surpassing front coxæ, its basal joint not extended beyond hind border of eyes; pronotum with side margins feebly toothed, its collar distinct; length, 13 or more mm.

V. *CIMOLUS*, p. 253.

I. *NAMACUS* Amyot & Serville, 1843, 242.

Differs from the other genera of the tribe in its longer, more parallel body, shorter legs and armed hind femora. From its nearest ally, *Margus*, also by the long simple or slightly forked veins of membrane. One of the three known species occurs in Florida.

174 (291). *NAMACUS ANNULICORNIS* Stal, 1870, 186.

Elongate, subparallel. Head, pronotum and scutellum dull red, thickly marked with fuscous punctures; clavus and corium dark reddish-brown, and with similar punctures, their veins paler; membrane dark brown, feebly bronzed; under surface smooth, bright orange red; tarsi fuscous. Antennæ dark brown, joints 2 and 3 each with a pale ring near base; 1 stoutest, curved, about as long as head; 2 and 3 cylindrical, 2 one-third longer than 1, 3 about two-thirds the length of 2, 4 fusiform, three-fourths as long as 3. Pronotum with sides straight, front angles slightly prolonged, hind ones obtusely rounded, disk finely and deeply punctate, the punctures in irregular transverse rows. Membrane long, reaching or slightly surpassing tip of abdomen. Connexivals with hind angles prolonged. Hind tibiæ deeply grooved above. Tarsal claws strongly divaricate. Length, 13—15 mm.

Ft. Myers, Fla., April 23 (*Davis*). Recorded also from Enterprise and St. Petersburg, Fla. Described from Mexico. The records are very few and none of them contain mention of its habits.

II. *MARGUS* Dallas, 1852, 523.

Rather small, oblong-oval glabrous species having the head as under tribal heading, calloused behind the eyes; ocelli separated by a space subequal to their distance from the eyes; beak reaching middle coxæ; pronotum subhexagonal, one-half wider across the humeri than long, front side margins feebly sinuate, slightly reflexed, the front angle ending in a short tooth, humeri obtusely rounded, posterior side margins short, sinuate; elytra with veins prominent, the apex of corium straight, oblique, its outer angle obtuse; connexivum widely exposed, its margins broadly curved; apex of dorsum broadly rounded,

entire, projecting beyond the scoop-shaped genital plate in male, in female narrowly produced, emarginate, and, in connection with the apical angles of the two preceding segments, causing the apical third of abdomen to appear coarsely serrate.

Twelve species are recognized by Stal (1870, 184) as occurring in tropical America, two of which extend northward into this country. One is found in the eastern states.

175 (290). *MARGUS OBSCURATOR* (Fabricius), 1803, 200.

Oblong or oblong-oval, depressed above, subconvex beneath. Dull grayish-yellow thickly marked with small fuscous punctures; antennæ reddish-brown, the basal and terminal joints slightly darker; margins of pronotum and connexivum and nervures of elytra sprinkled with fuscous dots; membrane bronzed-brown; dorsum of abdomen wholly or in great part black; under surface and legs greenish-yellow sprinkled with reddish dots, the sides of ventrals 1—5 each with a small round black spot. Antennæ with basal joint stout, curved, granulose, subcylindrical, narrowed at base, two-thirds or more the length of head; 2 and 3 slender, subequal; 4 stouter, fusiform, two-thirds the length of 3. Outer side of antenniferous tubercles with apex acutely produced. Pronotum with disk finely, evenly, not densely punctate, the humeri slightly tuberculate within. Scutellum and elytra similarly punctured, each puncture bearing a minute rounded yellowish scale. Other characters as under tribal and generic headings. Length, 9—11 mm.; width, 3—3.7 mm.

Ormond, Moore Haven, Sarasota and Dunedin, Fla., Feb. 6—April 27. Recorded from five additional stations between Big Pine Key and Jacksonville, and probably occurs sparingly along or near the coasts of the State. It was originally described from Rio Janeiro and the first specimens known from the United States were taken by me from flowers of thistle and *Senecio* at Ormond, Fla., and recorded (1902, 225) as *Margus inornatus* Stal, it having been so identified for me by Van Duzee. About Dunedin it occurs in some numbers in early spring on tall grasses and low shrubs in old fields and open pine woodlands and is also occasionally taken at light. Van Duzee (1909, 160) found it "not uncommon on sedges and grasses on the marshy meadows of Lake Monroe at Sanford, and under similar conditions at Crescent City and St. Petersburg." In general appearance it resembles superficially some of our more common species of *Harmostes*.

III. *CATORHINTHA* Stal, 1859, 470.

Small or medium sized oblong glabrous species having the head subquadrate, calloused behind the eyes, broader across

the eyes than long; antenniferous tubercles usually small, widely separated, in our species usually armed above on outer side with a prominent spine and furnished beneath with a small horizontal shelf-like plate or expansion of the genæ; tylus convex, longer than cheeks and with them moderately declivent between the antennal bases; beak reaching middle coxæ; antennæ half the length of body, first joint moderately stout, feebly curved, one-half or more the length of head, 2 and 3 more slender, the second longest, fourth a little thicker, fusiform, three-fourths or more the length of third; pronotum with front side margins minutely serrulate, feebly converging from humeri to apex, the latter three-fourths the greatest width, disk with front portion subconvex, but little declivent, humeri obtusely rounded, not prominent; abdomen with sides subparallel, connexivum rather narrowly exposed. Other characters as in key and under tribal heading.

Eight species are known from the United States, four from our territory.

KEY TO EASTERN SPECIES OF CATORHINTHA.

- a.* Legs mottled with black dots or spots; fourth antennal three-fourths the length of third.
- b.* Side margins of pronotum feebly but evidently concave; ventrals dull yellow with minute fuscous punctures and also a small blackish spot each side; smaller, not over 9 mm. 176. GUTTULA.
- bb.* Side margins of pronotum straight; ventrals either in great part black or mottled with numerous large black spots; larger, 10—12 mm. 177. MENDICA.
- aa.* Legs without black dots or spots; fourth antennal as long as third; length, 11.5—12 mm.
- c.* Tibiæ bright green; antenniferous spines stout, black, prominent; general color reddish-brown to dark fuscous-brown. 178. BORINQUENSIS var. VIRIDIPES.
- cc.* Tibiæ straw-yellow; antenniferous spines very small or wanting; general color pale dull yellow. 179. DIVERGENS.

176 (295). CATORHINTHA GUTTULA (Fabricius), 1794, 162.

Oblong or elongate-oblong, subdepressed above, subconvex beneath. Above dull grayish-yellow, thickly marked with fuscous punctures; antennæ black, the incisures, apical fourth or more of third joint and tip of fourth one, yellow; tip of scutellum and a small spot near middle of apical fourth of corium pale yellow; membrane fuscous-brown scarcely reaching tip of abdomen; connexivum alternated with yellow and black; dorsum black, yellow at middle; under surface dull yellow, the pleura and ventrals each side with a small median rounded black spot, the abdomen sparsely sprinkled with small black spots, the ends of the ven-

trials in part blackish; legs yellow mottled with black points and dots. Basal joint of antennæ half the length of head. Pronotum finely, evenly and rather closely punctate, more sparsely so on apical third, with very small irregular, slightly elevated smooth spaces between the punctures. Scutellum similarly sculptured. Elytra more finely, evenly and rather closely punctate. Length, 8—9 mm.; width, 2.5—2.7 mm.

Dunedin, Fla., scarce, Feb. 7—April 24. Occurs especially on the flowers and foliage of a tall scurfy ericad, *Nolisma ferruginea* (Walt.) which grows in clumps in dry sandy open woods; also taken in some numbers from beneath a gunny sack in an orange grove. Barber records it from Crescent City, Sevensacks, Biscayne Bay, Miami and Jacksonville, so that it probably occurs throughout the State. A West Indian species, ranging in this country from Florida to Colorado, Texas and Arizona.

The connexivum in all my Florida specimens is distinctly alternated with black and pale yellow, but Van Duzee (1907, 12) says that in most of those found in Jamaica it is immaculate. The abdomen in some specimens is devoid of black spots except the row of small round ones each side, in others it is rather thickly sprinkled with small black dots and dashes.

177 (296). CATORHINTHA MENDICA Stal, 1870, 187.

Form of *guttula* but larger. Color above much as there, the fuscous punctures coarser and, especially on pronotum, more evenly distributed; connexivum alternated with black and orange-yellow; antennæ as in *guttula*; under surface darker, the abdomen in some specimens almost wholly black, in others reddish- or greenish-yellow, thickly and evenly mottled with black spots, the row of round spots along the sides larger; legs more thickly mottled or banded with black, the tarsi and apical fourth of tibiæ wholly fuscous-black. Basal joint of antennæ stouter, two-thirds the length of head. Pronotum with disk in front of humeri more quadrate, more convex, less declivent and distinctly more evenly punctate. Scutellum with numerous transverse wrinkles between the rows of punctures. Length, 10—12 mm.; width, 3.3—3.7 mm.

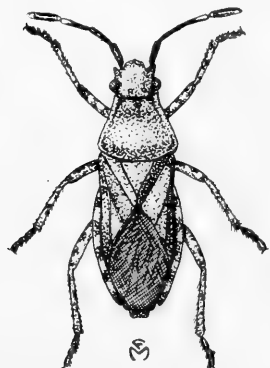


Fig. 50, X 3. (Original).

(Fig. 50).

Marion and Knox counties, Ind., June 6—Oct. 14; swept from railway embankments and along the banks of the White and Wabash rivers. On both dates mentioned, as well as others, it was taken in some numbers and in all stages on its

host plant, the heart-leaved umbrella-wort, *Allionia nyctaginea* Michx. Described from Texas and Mexico. Known also from Ohio, Illinois, Minnesota, Dakota, Colorado, Oklahoma and Arizona. Hart (1907, 238) records it from the sandy regions of northwestern Illinois as "common on *Rhus aromatica* Ait., *Allionia nyctaginea* Michx. and a variety of other plants, especially along roadsides."

178 (—). *CATORHINTHA BORINQUENSIS VIRIDIPES* var. nov.

Elongate-oblong. Head dull yellow with two ill-defined blackish stripes on front and a wider irregular one behind each eye; pronotum, clavus and corium dark reddish-brown, the area just within both apical and basal angles of pronotum vaguely blotched with fuscous; scutellum paler reddish-brown, its extreme tip yellowish; membrane pale brown; connexivum rather broadly exposed, strongly reflexed, segments 2—4 blackish-brown, with incisures and basal third of each yellowish, 5 and 6 wholly pale; under surface greenish-yellow tinged with reddish, the flanks of each pleurite and ventral with a rather large round black spot; a smaller similar spot on the outer side of each coxæ and two dots near middle of second and third ventrals; beak black, its basal joint paler; coxæ and basal two-thirds of all femora dull yellow, apical third of femora and all the tibiæ bluish- or bottle-green; tips of tibiæ and of each tarsal joint blackish. Antennæ with joint 1 black, extreme tips of 2 and 3 and middle of 4 fuscous-black; remainder of 2 and 3 and apex and base of 4 greenish-yellow; joint 1 stout, feebly curved; 2 and 3 slender, 2 longer than either 1 or 3; 4 stout, fusiform, almost as long as 2, its middle as thick as 1. Subantennal plate much reduced in size. Pronotum with sides straight, feebly converging from base to apex; disk with a distinct transverse impression across apical fourth, the area in front of this sparsely and finely punctate, remainder of disk, as well as those of clavus and corium coarsely, rather thickly and evenly punctate. Membrane with veins more numerous than in our other species, all of them nearly straight and but one or two of them forked. Length, 11.5 mm.

Royal Palm Park, Fla., Dec. 15; a single male beaten from fallen leaves of royal palm in the dense hammock on Paradise Key. The spines on head behind the bases of antennæ are almost as prominent as those of *Anasa armigera* (Say) while the veining of the membrane approaches closely that of *Marqus obscurator* (Fabr.). The typical *C. borinquensis* Barber (1923b, 1) is a Porto Rican species. It is smaller and more slender with spines on front of head reddish and distinctly more slender; black markings on head, antennæ and connexivals wanting; femora and lower surface thickly covered with red dots; small black spots on sternal pleurites only and tibiæ reddish-yellow.

179 (—). *CATORHINTHA DIVERGENS* Barber, 1926a, 214.

Elongate, subparallel. Color a nearly uniform pale clay yellow; eyes and joint 4 of antennæ fuscous-brown; ocelli red; edge of costal margin greenish; dorsum pale yellow with a red stripe each side of middle; tibiæ and tarsi tinged with fuscous. Joint 1 of antennæ subclavate, distinctly curved, slightly longer than width of vertex, its posterior face with two rows of setigerous granules; 2 and 3 much more slender, 2 one-half longer than 3, 4 stouter, fusiform, slightly longer than 3. Pronotum distinctly broader and less convex than in *viridipes*, sides straight and feebly converging from base to apex; disk with a transverse impression at apical third, behind this a fine median carina and thickly beset with yellowish granulate punctures. Scutellum and elytra similarly granulate-punctate. Length, 12 mm.

Tampico, Mexico, Dec. 18 (*Barber*). Taken at Paradise Key, Fla., Feb. 21, by Schwarz and Barber. Known also from Cuba.

IV. *ANASA* Amyot & Serville, 1843, 209.

Elongate-oval species of medium size having the head subquadrate, calloused behind the eyes; tylus longer than cheeks and with them somewhat compressed and moderately declivent in front of antenniferous tubercles; beak reaching or passing middle coxæ; antennæ slender, half the length of body, basal joint moderately swollen, feebly curved, about as long or slightly longer than head, 2 and 3 more slender, the second longest, fourth fusiform, shorter than third; pronotum subhexagonal, but little longer than wide, the apex one-half or less the greatest width, front portion strongly declivent, its side margins entire or finely serrulate; corium with apex oblique, feebly sinuate, its outer angle subacute; membrane reaching or passing tip of abdomen, its veins mostly forked; connexivum usually widely exposed; femora slender, usually unarmed; hind margin of metasternal pleurite straight; space between the hind coxæ less than half that between them and sides of metasternum. Other characters as in generic key and under tribal heading.

Thirty or more species have been described from America, seven of which are known from the United States. Of these five occur in our territory.

KEY TO EASTERN SPECIES OF *ANASA*.

- a. Head armed behind the base of antennæ with a spine or tubercle.
- b. Tubercle behind base of antennæ very small; head black with a median pale line; femora unarmed beneath.

- c. Pronotum with side margins produced forward at apex as a small blunt tooth and median pale line obsolete behind middle; dorsum black; fourth joint of antennæ fuscous-black, the tip slightly paler. 180. TRISTIS.
- cc. Pronotum with side margins not produced forward at apex, and median pale line entire or nearly so; dorsum yellow, or black with two pale spots; fourth joint of antennæ wholly or in great part yellowish. 181. ANDRESII.
- bb. Spines of head very prominent, longer than the diameter of the eye; head without a pale line; femora armed beneath near apex with one or two small spines.
- d. Basal joint of antennæ without black spots; connexivum alternated with black and orange; general color pale brownish-yellow. 182. SCORBUTICA.
- dd. Basal joint of antennæ with large black dots; connexivum alternated with black and pale yellow; general color fuscous. 183. ARMIGERA.
- aa. Head not armed above the base of antennæ; general color dull yellow; basal joint of antennæ beneath, black, above yellow dotted with black. 184. REPETITA.

180 (301). *ANASA TRISTIS* (De Geer), 1773, 340.

Oblong-oval, depressed above, convex beneath. Above dull clay-yellow, very thickly marked with rather coarse fuscous punctures, with numerous small irregular yellow smooth areas showing between them so as to give a somewhat mottled appearance; head fuscous with a narrow median line the full length and a shorter one each side, yellow; antennæ either wholly fuscous or dull yellow thickly marked with fuscous dots; front side margins of pronotum and tip of scutellum pale yellow; connexivum with front half of each segment yellow, the apical one irregularly marked with fuscous punctures and blotches; membrane fuscous-black; under surface and legs dull yellow thickly sprinkled with fuscous dots and punctures; beak and tarsi fuscous, the basal joint of former paler. Head with a minute nodule on the base of each antenniferous tubercle; basal joint of antennæ stouter than in our other species, distinctly curved, shorter than head, narrowed only at extreme base. Pronotum with front side margins nearly straight, thickened and reflexed, their edge minutely serrulate; humeri not prominent, their tips obtusely rounded; posterior side margins feebly sinuate, their inner angle subacute, truncate basal margin wider than scutellum. Apex of corium sinuate near tip. Membrane fuscous-brown, reaching tip of abdomen, male, a little shorter, female. Length, 13—18 mm.; width, 4.2—6 mm. (Fig. 51).

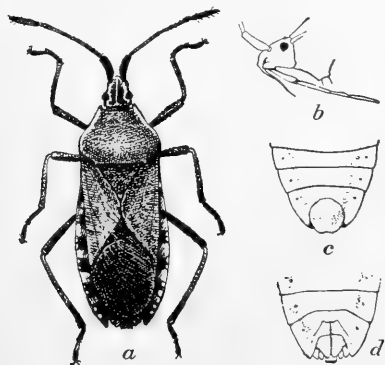


Fig. 51. a, female X 2; b, side view of head; c, ventral segments of male; d, same of female. (After Chittenden).

Common throughout Indiana, January—December. Holland, Mich., June 10. Occurs in summer in gardens and fields where squashes and other cucurbs are grown, and hibernates beneath rubbish and loose bark of logs and snags. Often a score or more will be found occupying a space a foot square beneath the bark. Many of them die before spring, especially if the winter is an open one with alternate freezing and thawing, but there are always plenty left for "seed." They have been found in winter a mile or more away from any spot where squash or kindred plant was grown the season before, thus showing that distance does not deter them from securing a hibernaculum to their liking.

Dunedin, Fla., March 20—27, scarce. Recorded from a half dozen stations from Jacksonville to Big Pine Key, and doubtless occurs in all the cultivated regions of the State, but apparently much less common than in the north. Ranges from Quebec and New England to the Pacific, and south and southwest to Arizona, Mexico and Brazil. This is the "squash-bug" of economic literature, and being the most common, most injurious and best known species of Coreidæ, that name has been adopted as the common or typical one for the family. Its habits, life history, distribution and remedies for riddance are fully set forth in various economic documents, chief among which are those of Chittenden (1899, 1908). Uhler (1876, 293) says that: "In the larval stage they are often guilty of cannibalism, the stronger ones sucking the juices of the weaker, and leaving only their dried empty skins to attest their places upon the squash vines." The *Coreus ordinatus* Say (II, 244) is a synonym. He says that "when taken it diffuses an odor which has been compared to that of a ripe pear."

181 (303). *ANASA ANDRESII* (Guerin), 1857, 383.

Elongate, sides parallel. Dull greenish-yellow, thickly marked above and below with small blackish punctures, those on front half of pronotum sparsely, irregularly placed, those on vertex, ventrals and apical third of corium more or less condensed to form small blackish spots or blotches; narrow median line of head and pronotum and narrow side margins of pronotum calloused, smooth and pale; membrane dull black; basal third of each connexival yellow, apical third black, its middle pale with black dots; legs greenish-yellow, the femora thickly dotted with fuscous, the tibiæ more sparsely so. Basal joint of antennæ as long as head. Pronotum with side margins feebly crenulate; basal angles obtusely rounded. Other characters as in key. Length, 13—15 mm.

Tallulah, La., on cotton (*U. S. Nat. Mus.*). A neotropical species described from Cuba and recorded in this country from Florida, Louisiana, Texas and New Mexico. Uhler (1875, 293) records it from southern Florida without definite station. Occurs also in southern California, Mexico, Central America and Colombia. It is smaller, more narrow and parallel than *tristis*, with median pale line of pronotum entire and apical joint of antennæ yellowish.

182 (306). *ANASA SCORBUTICA* (Fabricius), 1775, 706.

Elongate, slightly widened behind middle of abdomen. Pale straw-yellow, thickly, evenly and rather finely punctate, each puncture enclosing a minute golden yellow hair; membrane dark brown; femora and tibiæ with rows of purplish-brown dots; ventrals minutely punctate, finely pubescent. Antennæ wholly yellow, joints 1—3 thickly clothed with short, inclined bristle-like brown hairs; 2 and 3 subequal, each but little longer than 1. Connexivum rather broadly exposed. Length, 12—14 mm.

Brownsville, Tex., June (*U. S. Nat. Mus.*). Recorded from Biscayne Bay, Fla.; also from Oklahoma, Texas, Mexico and the West Indies.

183 (307). *ANASA ARMIGERA* (Say), 1825, 319; II, 244.

Elongate-oblong, depressed above, convex beneath. Above dull yellow, thickly marked with fuscous punctures, each of which bears a minute appressed yellowish hair; antennæ with basal joint pale yellow dotted with black, 2 and 3 black, pale at base and tip, 4 pale yellow; corium and basal half of pronotum sometimes wholly or in great part fuscous; membrane bronze-brown; connexivum black, the basal fourth or more of each segment pale yellow; under surface greenish-yellow marked with fine, rather sparse reddish-brown punctures each of which

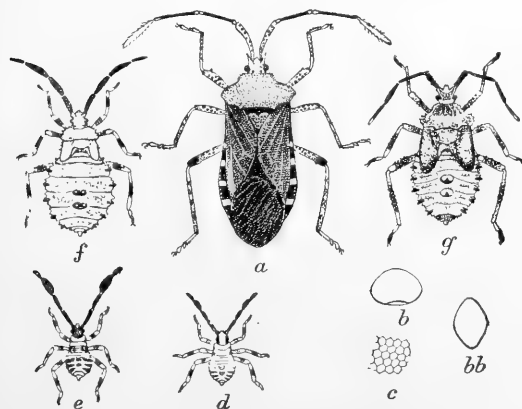


Fig. 52. *a*, adult X 2; *b* & *bb*, eggs in profile from side and above; *c*, sculpture of egg; *d*—*g*, nymphs in various stages X 2. (After Chittenden).

bears a yellowish hair; abdomen with widely scattered black dots; legs pale yellow thickly marked with larger black dots and small points. Head with a pair of long acuminate suberect, feebly divergent spines. Basal

joint of antennæ but little swollen, slightly curved, longer than head. Pronotum with front side margins concave or sinuate; humeri prominent, projected outward and a little upward, their tips subacute; basal half of disk with a median impression, the truncate base wider than scutellum, the latter coarsely and sparsely punctate. Abdomen dilated at middle, more so in female, the connexivum broadly exposed. Length, 13—17 mm.; width, 4.5—6.5 mm. (Fig. 52).

Marion, Vigo, Knox and Posey counties, Ind., March 17—Oct. 10. Occurs locally in some numbers, in company with *repetita* on the one-seeded bur-cucumber, *Sicyos angulatus* L. Taken in March from beneath bark in low dense woods along the margins of streams, in which localities its wild host-plant alone grows. Dunedin, Lake Okeechobee, R. P. Park and Cape Sable, Fla., Dec. 11—March 24, scarce. Taken by beating in dense wet hammocks. Recorded from Florida only by Uhler without definite station. Its recorded range extends from Massachusetts to western Iowa, and south and southwest to Florida, Oklahoma and Texas. In the East it probably occurs rarely, if at all, north of latitude 42°. Say's type was from "Missouri Territory" and must have been off color, as he mentions "a white oblique line in the middle of the membranaceous portion of the hemelytra," and in his notes said that it may be at once separated from *Corcus galeatus* Fabr. "by the white transverse line at the base of" the same membrane. No one of the numerous specimens I have seen is so marked.

Chittenden (1898, 239) records it as injurious to cucurbs in Maryland and Virginia, all stages including the eggs being found as late as Sept. 29. He states: "It is more active than *tristis*, flying freely in hot sunshine and exposing itself on the upper surface of the leaves in mid-day. It also has a later season, appearing three weeks later and remaining in the field after *tristis* has gone into hibernation."

184 (304). *ANASA REPETITA* Heidemann, 1905, 11.

Elongate-oval, depressed above, convex beneath. Above dull yellow, thickly marked with rather small reddish granulate punctures; head yellow, almost impunctate; antennæ with joint 1 black beneath, yellow with a few black dots above, 2 and 3 black, the incisures pale, 4 reddish-yellow; tip of scutellum, some small irregular markings on elytra and the extreme base of membrane fuscous; connexivum alternated with fuscous and yellow; membrane bronzed-brown with scattered fuscous dots; under surface greenish-yellow often shaded with fuscous; femora and tibiæ yellow thickly marked with black dots; beak, except tip, and tarsi greenish yellow. Head unarmed, a little shorter and broader than that

of *tristis*; antennæ as in *armigera*. Pronotum with front side margins concave or deeply sinuate, their edges crenulate; humeri prominent, prolonged outward and a little upward, the tips obtusely angled; posterior side margins sinuate, their inner angle obtuse, the truncate basal margin wider than scutellum. Membrane slightly surpassing abdomen, the latter rather widely dilated beyond middle. Connexivum broadly exposed and recurved, the dorsum therefore appearing concave. Genital plate of male scoop-shaped, its hind margins feebly concave. Basal plates of female genitalia deeply and widely emarginate. Length, 14—16 mm.; width, 6—7 mm.

Marion, Knox and Posey counties, Ind., April 19—Sept. 19 (*W. S. B.*). Alexandria County, Va., May 28 (*Davis*). In a dense thicket along the annually overflowed banks of the Wabash River a few miles above Vincennes, I beat this handsome Coreid, on Sept. 19, in large numbers and all stages from the wild cucumber, *Sicyos angulatus* L. Parshley (1918, 64) records the taking of more than 50 adults and nymphs from two vines of the same plant on the same date at Northampton, Mass. It has been recorded elsewhere only from New York, Maryland and District of Columbia.

V. CIMOLUS Stal, 1862, 302.

This genus differs from *Anasa* by the characters given in key, and in having the body more narrowly oval, less depressed; antenniferous tubercles much less prominent and more approximate, suberect; beak much shorter, its first joint only about half the length of head. Two species are known, one occurring in Mexico, the other in the southern states.

185 (300). CIMOLUS OBSCURUS Stal, 1870, 189.

Elongate-oval, widest across middle of abdomen. Dull clay-yellow, above thickly beset with rather coarse fuscous punctures, each enclosing a minute yellowish bristle, these punctures so arranged as to leave a stripe each side of head, the side margins and a narrow median line on front half of pronotum and numerous small scattered areas on elytra of the paler hue; membrane dark brown; connexivals blackish, the front margin of each yellowish; legs dull yellow, thickly marked with fuscous punctures; under surface greenish-yellow with scattered fuscous dots and punctures, the extreme side margins of each ventral with one or two oblong black spots. Antennæ black; joint 1 with a few paler dots, stout, feebly curved, as long as head; 2 more slender, slightly longer than either 1 or 3, these subequal in length; 4 fusiform, two-thirds the length of 3. Pronotum subtrapezoidal, side margins finely serrate, front angles ending in an obtuse spine, hind ones broadly rounded, hind margin abruptly declivent and forming a short flattened lobe which is wider than

base of scutellum. Connexivum widely exposed. Membrane slightly passing tip of abdomen. Genital plate of male scoop-shaped, its basal half strongly convex. Length, 13—14 mm.; width, 5.5 mm.

Baton Rouge, La., Aug. 31; collected on *Mclothria pendula* L. (*Barber*). Described from South Carolina and Texas and not recorded elsewhere. Closely resembles *Anasa tristis* but easily distinguished by the shorter beak and very small antenniferous tubercles.

Subfamily III. PSEUDOPHLÆINÆ Stal, 1867, 535.

The members of this subfamily have the head convex, triangular, three-fourths or more the width of pronotum, narrowed, feebly declivent and prolonged forward in front of antennæ; disks of pronotum, scutellum and elytra roughly granulate, each granule or puncture bearing a small appressed seta; membrane with curved basal vein remote from the margin, the veinlets arising from it anastomosing at base, forked near apex; osteola with margins compressed between the sub-contiguous middle and hind coxæ, the outer portion prolonged laterally slightly beyond them, without an auricle but with edges thickened and apex rounded; tibiæ terete, not sulcate or dilated.

Eight genera are recognized by Stal (1870, 219; 1873, 81). six from the Old World and two from the United States. Both of these are represented in the eastern states.

KEY TO EASTERN GENERA OF PSEUDOPHLÆINÆ.

- a.* Joints 2 and 3 of antennæ subequal; beak not reaching middle coxæ; humeral angles rounded, unarmed; larger, length, 10—13 mm.
 - I. CERALEPTUS.
- aa.* Joint 2 of antennæ distinctly shorter than 3; beak reaching between middle coxæ; humeral angles with an acute fuscous tooth; smaller, not over 9 mm.
 - II. CORIOMERIS.

I. CERALEPTUS Costa, 1847, 11.

Elongate-oval species of medium size, possessing the characters of the subfamily as above set forth and having the tylus convex, longer than cheeks, deflexed in front of them; antenniferous tubercles small, not prominent, armed on the outer side with a small curved obtuse spine; antennæ short, stout, joint 1 subclavate, half the length of head, 2 and 3 slightly longer, subequal, 4 fusiform, shortest; beak stout, joint 2 but

slightly surpassing the head, subequal to 3 and 4 united, 3 the shortest; ocelli small, separated more widely than the distance between them and eye; pronotum subquadrate, one-third wider than long, side margins slightly sinuate, feebly converging from the bluntly rounded humeri to apex, their edge granulate, not carinate; membrane reaching tip of abdomen, its veins as described above; abdomen moderately dilated near middle, the connexivum rather widely exposed, reflexed; legs short, stout, middle femora armed with one or two small spines; hind ones subclavate, shorter than abdomen, armed beneath near apex with 3—5 unequal spines.

Two species are known, one confined to the Pacific Coast States, the other ranging from Indiana and Florida westward.

186 (332). *CERALEPTUS AMERICANUS* Stal, 1870, 219.

Elongate-oval, depressed above, convex beneath. Above grayish-yellow marked with numerous fuscous punctures; head fuscous with a median line along the tylus and a narrower one each side dull yellow; antennæ reddish-brown, the last two joints dusky; membrane fuscous with vague yellowish markings; connexivum dull yellow mottled with fuscous; under surface dull yellow the sides of abdomen with two interrupted fuscous stripes, the inner one the wider; femora dull yellow mottled with fuscous; tarsi and tip of beak fuscous. Structural characters as given above. Length, 10—13 mm.; width, 3—3.5 mm.

Vigo Co., Ind., Dec. 10—March 28. One specimen taken on each of three occasions in 1893 from beneath logs on the side of a high sandy hill near the old canal, five miles north of Terre Haute. Recorded by me (1895, 269) but Indiana not included in the Van Duzee Catalogue notes. Dunedin, Fla., March 24; one specimen swept from herbage along the bay front. Barber records it from Lake Worth, Fla., these being the only records from east of the Mississippi. Described from Texas and known also from Utah, Arizona, California and Mexico. Uhler (1876, 300) says that old specimens from the West "are almost black, with antennæ wholly black and pale bands of connexivum very distinct."

II. *CORIOMERIS* Westwood, 1842, 6.

Oblong-oval, pubescent species differing from *Ceraleptus* by the characters given in the key, and having the head less prolonged in front of antennæ, more subquadrate; antennæ shorter, stouter, with joint 1 coarsely granulate and hirsute; pronot-

tum with front portion more narrowed and more strongly declivent; connexivum more widely exposed; hind femora more slender, subcylindrical, armed beneath near apex with a slender curved spine and several minute teeth.

187 (333). *CORIOMERIS HUMILIS* (Uhler), 1872, 403.

Oblong-oval, widened behind. Above dull grayish-white, thickly punctate with fuscous; head densely covered with fuscous granules, the median line slightly paler; edges of side margins of pronotum whitish, finely denticulate; membrane grayish, the oblique veinlets brown; connexivum alternated with fuscous and yellow; under surface dull yellow, thickly flecked with fuscous markings; femora fuscous, covered with whitish granules; tibiæ dull yellow; tarsi and beak darker. Antennæ short, stout, joints 1—3 fuscous-brown; 1 stoutest, feebly curved, subequal in length to 3; 4 blackish, slightly shorter than 3, subfusiform, finely pubescent, as thick as 1. Other characters as previously given. Length, 8.5—9 mm.

Chitnia Glacier, near Mt. St. Elias, Alaska, June (*U. S. Nat. Mus.*). Recorded from St. Petersburg, Fla., Nov. 12, by Bueno (1921, 61). Ranges from Florida and Texas west to the Pacific and north to Kansas and British Columbia.

Family VII. CORISCIDÆ⁴⁴ nom. nov.

THE BROAD-HEADED BUGS.

Elongate, slender bodied species of medium size having the head porrect or feebly declivent, at times nearly as wide and long as pronotum, its front portion narrowed and produced forward in front of base of antennæ, the part between the eyes wider than scutellum; eyes very prominent; ocelli large, more narrowly separated than the distance between them and the eyes; apical joint of antennæ as long as, or longer than, third; nervures of membrane usually simple; fourth and fifth dorsals concavely curved at base; spiracles placed near the apical margins of ventrals; osteolar openings present except in *Tollius* and *Stachyocnemus*; first joint of hind tarsi usually more than twice as long as second and third united.

Our species occur principally on the foliage and flowers of herbs and shrubs along roadsides and the borders of woods, and are usually so few in number as to be of little economic importance. They have heretofore been usually treated as a subfamily of the Coreidæ. The principal literature treating

⁴⁴Horvath (1917, 378) has shown that *Alydus* Fabr. (1803) and *Coriscus* Schrank (1796) were both founded with the same species, *Cimex calcaratus* L. as the generic type. The name of Schrank therefore has precedence and the family name should be Coriscidæ, not Alydidæ.

of them is by Say, 1824; Stal, 1870; Montandon, 1893, and Fracker, 1918. The family is divided by recent authors into three tribes, all of which are represented in the eastern states.

KEY TO TRIBES OF CORISCIDÆ.

- a.* Hind femora very slender, not armed beneath; cheeks, in our eastern species, much longer than tylus and contiguous in front of it.
- b.* Fourth joint of beak at least twice as long as third, second longer than third and fourth united. Tribe I. MICRELYTRINI, p. 257.
- bb.* Third and fourth joints of beak subequal, second not longer than third and fourth united; body and legs very slender. Tribe II. LEPTOCORISINI, p. 259.
- aa.* Hind femora armed beneath with one or two rows of spines; cheeks shorter than tylus. Tribe III. CORISCINI, p. 260.

Tribe I. MICRELYTRINI Stal, 1867, 542.

Of the four genera representing this tribe in the United States, but one occurs east of the Mississippi.

I. PROTENOR Haglund, 1868, 162.

Elongate, very slender species having the head porrect, slightly longer than pronotum; cheeks much longer than tylus, contiguous in front of it, their tips subconical and cleft horizontally, so that the front of head ends in four short processes; antennæ slender, nearly as long as body, first joint subclavate, subequal to second, third slightly shorter, fourth about one-half longer than second; beak surpassing middle coxæ, its third joint very short; ocelli placed close to hind margin of head, the interval separating them less than one-third that between them and eye; pronotum subtrapezoidal, slightly longer than wide at base, its side margins straight, entire, visibly narrowing from humeri to apex; membrane shorter than abdomen, the latter not wider than elytra; legs rather short, hind femora not passing fourth ventral; hind angles of metapleura subacute. Two species are known.

KEY TO SPECIES OF PROTENOR.

- a.* Head less than one-fourth longer than pronotum; upper and lower pair of apical processes of cheeks contiguous or nearly so throughout their length. 188. BELFRAGEI.
- aa.* Head one-half longer than pronotum; upper processes of cheeks widely separated from lower throughout their length. 189. AUSTRALIS.

188 (312). *PROTENOR BELFRAGEI* Haglund, 1868, 162.

Elongate, very slender, depressed above, convex beneath. Pale brownish-yellow, shining, thickly marked above with more or less fuscous, rather coarse punctures; antennæ reddish-yellow; membrane pale brown; under surface dull yellow sprinkled with reddish dots; abdomen with a median dark line, the sides with an irregular row of small piceous

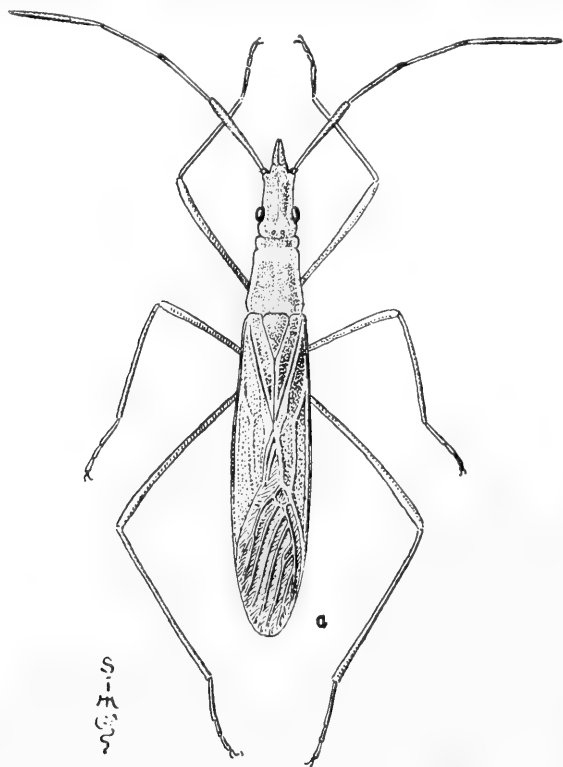


Fig. 53, X 5. (After Drake, Tech. Pub. No. 16, N. Y. St. Coll. For.).

spots; legs and beak reddish-yellow, the tip of latter piceous. Head with a short median groove behind the antenniferous tubercles. Pronotum slightly impressed near apex, forming a collar, its humeri obtusely rounded, not prominent. Length, 12—15 mm.; width, 1.2—1.8 mm. (Fig. 53).

Marshall and Putnam counties, Ind., scarce, July 28—Aug. 18. Swept from sedges and grasses along the borders of lakes and marshes. Probably occurs sparingly throughout the northern two-thirds of the State. Sherborn, Mass., Sept. 6 (*Frost*). The known range extends from Quebec and New England west to Colorado and south and west to Maryland and Texas. The only record for Texas is that of Uhler (1876, 295) without

definite station. Outside of this record it appears, according to Fracker (1918, 258) "to be limited to the territory north of Maryland and east of the Rocky Mountains." He says that it is found throughout Wisconsin, "the immature feeding on sedges and the adults being especially common in low meadows after the first of August and until frost, probably hibernating."

189 (—). *PROTENOR AUSTRALIS* Hussey, 1925, 64.

Smaller and more slender than *belfragei*. Pale straw-yellow, sub-opaque, thickly marked with small fuscous punctures; sides of head and pronotum with a brown stripe extending from front of cheeks across eyes to humeral angles and more narrowly along costal margin of elytra; membrane brownish translucent, impunctate. Head three times as long as its basal width. Antennæ with joints 1 and 2 dull yellow, thickly dotted with red; 3 and 4 reddish without dots; 1—3 conspicuously hirsute; relative lengths 5:6:5:9. Median pale calloused line of pronotum very narrow, percurrent. Hind femora reaching only to fifth ventral. Other characters as in *belfragei*. Length, 11—11.5 mm.

Royal Palm Park, Fla., March 20; swept from roadside herb-age (*W. S. B.*). Ft. Myers, Fla., April 24 (*Davis*). Known elsewhere only from Gainesville, Fla., and Thomasville, Ga.

Tribe II. LEPTOCORISINI Stal, 1872a, 54.

This tribe comprises numerous genera in the Old World but only two in America. Of these one is represented in the southern states.

I. LEPTOCORISA Latreille, 1829, 197.

Very slender bodied elongate species having the head porrect, relatively small and narrow; cheeks subcylindrical, much longer than tylus and contiguous in front of it; eyes and ocelli very prominent; antennæ very slender, nearly as long as body, the basal joint longest, reaching middle of pronotum, but little swollen toward apex; beak reaching middle coxæ, joints 1 and 2 subequal, each a little shorter than 3 and 4 united, these also subequal; pronotum with side margins straight, entire, feebly converging from the humeri to apex, which is two-thirds the width of base, their carinæ obsolete on apical third; elytra very long and slender, entirely concealing the abdomen; hind coxæ contiguous; hind angles of metapleura acute.

This genus is represented by numerous species in all parts of the world, three of them occurring in neotropical America, one of which extends northward into the southern United States.

190 (316). *LEPTOCORISA TIPULOIDES* (De Geer), 1773, 354.

Elongate, very slender, subdepressed above, convex beneath. Pale dull yellow; antennæ greenish- or reddish-yellow, the tips of joints 2—4 darker; inner raised margin of clavi and membrane in front of the cross nervure, more or less fuscous; legs greenish-yellow, the femora reddish on apical fourth; tarsi and tip of beak tinged with fuscous. Head about two-thirds the length of pronotum; antennæ with joints 2 and 3 subequal, 4 longer, subequal to 1. Pronotum with humeri rounded, not prominent, feebly tuberculate at each end of the basal impression; disk with front portion almost smooth, the basal two-thirds coarsely confluent punctate. Scutellum elongate-triangular, both it and clavi coarsely and rather closely punctate. Corium very sparsely punctate, its apical margin extremely long and sinuate. Abdomen with sides parallel throughout. Genital plate of male scoop-shaped. Sixth ventral of female produced behind as a large flat median lobe. Length, 14—16 mm.; width, 1.8—2 mm.

Dunedin, Lakeland and Ft. Myers, Fla., Nov. 20—March 20 (H. S. B.). Agricultural College, Miss. (*Wied*). Recorded from numerous stations throughout eastern and southern Florida. It is a Central and South American species, known heretofore in this country only from Florida and Texas. About Dunedin it is common in autumn and early spring on ferns in wet densely wooded hammocks. The body is more slender and parallel than in any other of our eastern Coriscids.

Tribe III. CORISCINI⁴⁵ nom. nov.

The members of this tribe are somewhat stouter and have the head broader and pronotum shorter than in the two preceding tribes. They also have the eyes more convex and prominent; cheeks shorter than tylus; hind femora stouter and armed beneath with prominent spines.

Six genera are known from North America, all of which are represented in the eastern states.

KEY TO EASTERN GENERA OF CORISCINI.

- a. Hind tibiæ compressed, strongly curved, the tip ending in an acute spur; humeri ending in a prominent suberect acute spine.
 - I. *HYALYMENUS*, p. 261.
- aa. Hind tibiæ straight, terete, without a spur at apex.
 - b. First joint of antennæ surpassing apex of head; osteolar opening distinct, located between the middle and hind coxæ, prolonged outwardly as a canal.
 - c. Second joint of antennæ shorter than first; sixth ventral of female slit along the median line.
 - d. Pronotum longer than wide, the sides converging toward apex;

⁴⁵New tribal name for *Alydini* Stal.

tibiæ unarmed; basal joint of hind tarsi more than twice the length of second and third united. II. MEGALOTOMUS, p. 262.

dd. Pronotum as wide at base as long, the sides parallel; apex of hind tibiæ armed with a small acute tooth; basal joint of hind tarsi about one and a half times the length of second and third united. III. BURTINUS, p. 263.

cc. Second joint of antennæ longer than first; sixth ventral of female entire. IV. CORISCUS, p. 264.

bb. First joint of antennæ not surpassing apex of head; osteolar opening very small or obsolete.

e. Hind tibiæ unarmed; hind margin of pronotum without a median tooth. V. TOLLIVUS, p. 267.

ee. Hind tibiæ armed with two rows of spines; hind margin of pronotum with a small median tooth. VI. STACHYOCNEMUS, p. 268.

I. HYALYMENUS Amyot & Serville, 1843, 223.

Elongate, slender bodied species having the head feebly declivent, convex, triangular, almost as long as pronotum; ocelli very prominent, subpedunculate; beak reaching middle coxæ, the fourth joint a little longer than third; pronotum subquadrate, strongly declivent, its side margins without carinæ, humeri each ending in a strong upward and outward projecting spine; abdomen a little wider than elytra; connexivum narrowly exposed, the hind angle of each segment prolonged; membrane slightly surpassing abdomen, its veins numerous, simple; hind coxæ contiguous; front and middle femora armed beneath near apex with one or two fine teeth; hind ones swollen, clavate, armed beneath with numerous teeth, two near middle very prominent; hind tibiæ as in key, their lower margin crenulate at middle of outer margin in the males; in the females less curved, the margin entire.

Three neotropical species are known from the United States, one occurring in Florida.

191 (318). HYALYMENUS LONGISPINUS Stal, 1870, 213.

Elongate, slender, depressed above, subconvex beneath. Above dull yellow; antennæ reddish, the apical half of terminal joint darker; under surface pale yellow, meso- and metasterna tinged with fuscous; sixth ventral and genital plate reddish-brown; hind tibiæ and apex of femora dark red. Antennæ half or more the length of body, first joint longer than head, the apical half feebly swollen, fourth longer than second and third united, these subequal. Pronotum wider across the humeri than long, disk depressed along the middle, finely, densely and deeply punctate, transversely impressed near apex, the impression bearing a pair of small median pale yellow callosities; posterior side margins sinuate, minutely toothed at middle, their inner angle ending in a short spine; trun-

cate basal margin not wider than scutellum and with a small median callosity. Scutellum and corium rather coarsely sparsely punctate, clavi more closely so. Length, 14—16 mm.; width, 3.2—4 mm. (Fig. 54).

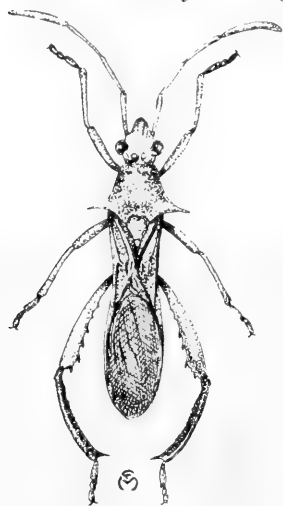


Fig. 54, X 3. (Original).

Dunedin, Miami and Cape Sable, Fla., Nov. 19—March 11; three beaten from buttonwood and beach grape on Hog Island, the others swept from tall dead grasses along a low meadow. A West Indian species, recorded by Barber from five additional Florida stations, all near the coast of the southern third of the State.

II. MEGALOTOMUS Fieber, 1861, 58.

Elongate-slender species having the head declivent, flat, triangular, about as long as pronotum; ocelli and eyes prominent; antennæ very slender, half or more the length of body, first joint passing apex of head, second slightly longer than third, fourth stouter, as long as or but little shorter than 2 and 3 united; beak slightly surpassing middle coxæ, the fourth joint slightly longer than third; pronotum subquadrate, moderately declivent, disk with side margins feebly sinuate, their edge carinate; abdomen not wider than elytra; hind coxæ separated by a distance equal to their width; hind femora but little swollen, reaching apex of abdomen, armed beneath on outer margin with a row of stout spines.

Two species are known, one from tropical America, the other from our territory.

192 (320). MEGALOTOMUS QUINQUESPINOSUS (Say), 1824, 323; II, 247.

Elongate, slender, depressed above, convex beneath. Color variable ranging from dull yellow, thickly mottled with fuscous to a nearly uniform dull red, those of the first named hue with base of head, narrow margins and numerous small blotches on disk of pronotum, scutellum except tip, under surface and apical half of hind femora, blackish-fuscous; the red form with a curved bar between the eyes and the carinæ of pronotum and middle of abdomen fuscous; antennæ in both forms reddish, the tips of joints 2 and 3 and apical two-thirds of 4 fuscous, the basal third of latter dull yellow; under surface of head and sterna in both black. Pronotum with humeri prominent, acute; disk finely and densely punctate and with a vague wide median lengthwise depression; pos-

terior margin sinuate, concave at middle. Claspers of male forked, the outer lobe the longer. Length, 14—16 mm.; width, 3—3.7 mm. (Fig. 55).

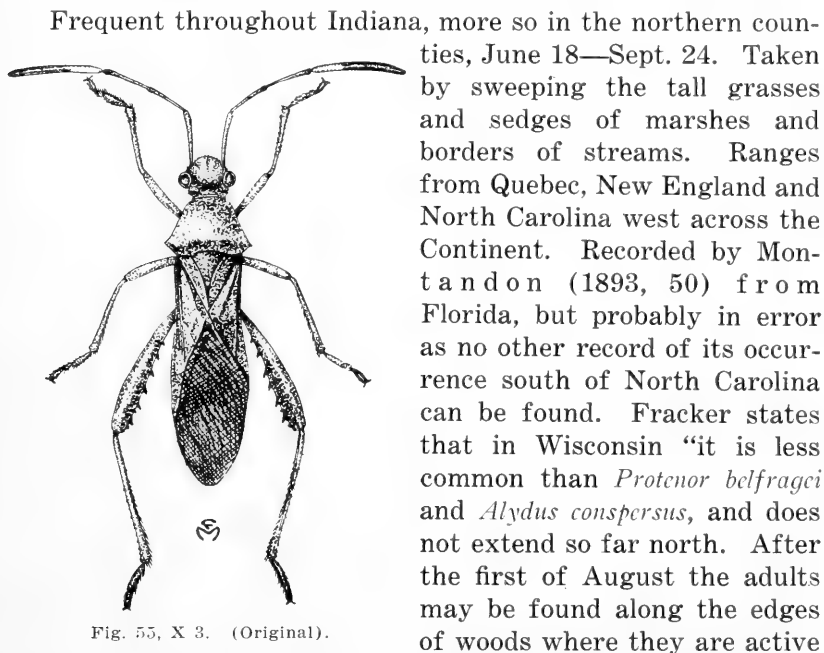


Fig. 55, X 3. (Original).

flyers." McAtee (1919, 8) says that about Washington, D. C., the nymphs occur only on *Ceanothus americanus*.

III. BURTINUS Stal, 1859, 458.

This genus is closely allied to *Megalotomus*, differing mainly by the characters given in key. The fourth joint of antennæ is slightly shorter than second and third united; apical angle of corium reaching beyond middle of membrane; hind femora not reaching apex of abdomen; hind tibiæ shorter, armed beneath near apex with a small spine.

One neotropical species is known from southern Florida.

193 (321). BURTINUS NOTATIPENNIS Stal, 1859, 459.

Elongate, slender, widened behind. Dull brownish-yellow, rather thickly marked with brown punctures; narrow edges of side margins of pronotum and embolium and tip of scutellum yellowish; membrane pale translucent; dorsum and connexivum in part fuscous; under surface and legs straw-yellow, with numerous small reddish dots, the former very finely and densely pubescent; apical half of hind femora in part fuscous, sometimes annulate with yellow; ventrals 2—5 with a large black dot each side; 2 and 3 each with several smaller dots at middle; 3—6 tinged

with fuscous. Head porrect, more or less fuscous, finely pubescent. Antennæ with joints 1—3 dull yellow, subequal in length, 1 feebly thickened toward apex, 4 with basal third yellow, remainder fuscous. Pronotum as in generic key, the humeral angles subacute. Hind femora clavate, the apical half armed beneath with three or four stout spines and two or three minute teeth. Length, 11—13 mm.

Brownsville, Tex. (*U. S. Nat. Mus.*). Recorded by Barber from Miami, Fla., and Arizona. Ranges from those states south to northern South America. The specimens at hand lack the “corii macula longe pone medium pallidis” mentioned by Stal in his original description and on which he based his specific name; nor can I find any trace of the teeth at base of hind femora used by Fracker (1918, 261) as the principal character in his generic key separating *Burtinus* from *Megalatomus*. Although using it thus, in his description of *B. notatipennis* farther along he says: “posterior femora . . . usually with an obsolete little tooth near base.” The *Alydus femoralis* (Distant, 1881, 158) is, as pointed out by Barber (1914, 521), a synonym.

IV. CORISCUS Schrank, 1796, 121.=(*Alydus*).

Elongate-slender bodied pilose species having the head declivent in front, nearly as long as pronotum and as broad across the eyes as base of latter; antennæ slender, half the length of body, first joint but little swollen, shorter than second; eyes very prominent, subpedunculate; beak reaching middle coxæ, joint 2 subequal to 3 and 4 united, 3 shortest; pronotum subquadrate, slightly longer than wide, its side margins slightly sinuate, entire; corium with apex very long, oblique, sinuate, its apical angle extending beyond middle of membrane, the latter reaching or slightly exceeding tip of abdomen; osteolar opening distinct, slit-like, situated between the middle and hind coxæ; femora relatively slender, front and middle ones unarmed, hind ones armed beneath with a row of stout spines and a few spinules; tibiæ slender, terete, unarmed; basal joint of tarsi twice the length of the other two united.

Six species are at present recognized from North America, three of which occur in the eastern states.

KEY TO EASTERN SPECIES OF CORISCUS.

- a. Pronotum with humeral angles obtusely rounded, the side margins not distinctly paler than the disk.
- b. Head and pronotum with numerous erect hairs; pronotum usually blackish-bronzed, rather coarsely and densely punctate; mem-

brane dark without fuscous spots; claspers of male twisted, not curved; lateral plates of female genitalia acute at apex.

194. EURINUS.

bb. Head and pronotum with few if any erect hairs; basal half of pronotum brown, very finely and sparsely punctate; membrane pale with vague fuscous spots; claspers of male curved, divaricate at base, convergent at tip; lateral plates of female genitalia broadly rounded at apex.

195. CONSPERSUS.

aa. Pronotum with humeral angles acute, the side margins calloused and pale.

196. PILOSULUS.

194 (323). CORISCUS EURINUS (Say), 1824, 324; II, 247.

Elongate, slender, depressed above, subconvex beneath. Color above variable from nearly wholly black to largely fuscous-brown, in the former (var. *obesus* Fracker) with head, pronotum, scutellum, under surface and femora black, shining, with a bluish-bronzed tinge; elytra fuscous-black, subopaque; connexivum black, each segment with a small orange-yellow spot near front angle; antennæ fuscous-brown, the basal joint and tips of joints 2 and 3 darker; tibiæ fuscous-brown, darker near apex; tarsi black, the basal joint in great part paler; in the more common typical form the elytra and tibiæ are brownish-yellow more or less tinged with fuscous. Head finely and densely punctate; antennæ with third joint a little shorter than second, the two united but little longer than fourth. Pronotum with carinæ of side margins distinct only on basal half; disk subconvex, but little narrowed in front, in great part rather coarsely, deeply and very densely punctate and with a small median impression on apical third; hind margin sinuate. Scutellum feebly convex, coarsely, not densely punctate. Elytra finely and sparsely punctate. Abdomen slightly dilated at middle, the connexivum rarely narrowly exposed. Length, 11–15 mm.; width, 2.3–3 mm.

Common throughout Indiana, more so in the northern counties, June 3—Oct. 1. Taken most frequently on foliage and flowers of Jersey-tea and other plants growing along the high, dry sandy margins of streams and lakes. In autumn often found crawling along the pathways in such places. A number were once taken, June 7, from the dried skin and other remains of a dead cow on a sandy hillside, and McAtee (1919, 8) also mentions them as found in Virginia on carrion. Dunedin, Fla., April 2, one specimen swept from weeds. Known heretofore from that State only by the single record of Montandon.

Ranges from Quebec and New England west to the Pacific and south to Florida, Georgia and Texas, but apparently much the more common north of latitude 38°. As noted in description, it varies much in color, the larger females often almost wholly black. It is easily separated from *conspersus* by the characters given in key, even by the sculpture and hairs of pro-

notum alone. Fracker (1918, 269) states that: "Throughout its range the adults are numerous in late summer along roadsides and the edges of woods on goldenrod and other fall flowers. The young have been bred on *Astragalus* in Colorado, appearing the middle of May."

195 (324). *CORISCUS CONSPERSUS* (Montandon), 1893, 49.

Form of *eurinus*, averaging smaller. Head, apical third of pronotum, under surface and femora black, feebly bronzed; elytra, basal portion of pronotum and tibiae, except apex, brownish-yellow; basal joint of tarsi in great part yellow; membrane dull yellow mottled with fuscous dots; color of antennæ as in *eurinus*; tip of scutellum and a spot near front angle of connexival and ventral segments, yellow. Pronotum slightly longer than wide, side margins straight, just visibly convergent from base to apex, their edge with carina very fine, entire; disk very finely and sparsely punctate, without antemedian impression as in *eurinus*, but with a vague median impressed line along apical two-thirds; humeri obtuse, rounded, a little more prominent and upcurved than in *eurinus*. Length, 10—12 mm.; width, 2—2.3 mm.

Lake and Kosciusko counties, Ind., June 28—Aug. 23. Occurs with *curinus* on various plants growing in dry sandy localities. Ranges from Quebec and New England west to Dakota and Colorado; not as yet recorded south of New Jersey. Fracker (1918, 270) states that: "In Wisconsin and neighboring states it is much more common than *curinus*. They mate in September and October and the winter is apparently passed in the egg stage." As noted under *curinus* this species is readily separated from that by the much finer and sparser punctuation of pronotum. In *curinus* both head and pronotum are clothed with numerous rather coarse erect brown or black hairs. In *conspersus* these are very few, but each one of the fine punctures, as well as those of elytra and abdomen, bears a minute appressed yellow hair.

Fracker has named the black form of *curinus* var. *obesus*, and the melanic smaller form of *conspersus*, having the membrane infusate, not dotted, as var. *infuscatus*, but these names, like those of all others based on color, have little value, as there are too many intergrading forms to which neither the specific nor varietal name will strictly apply. He has also reduced to a southern race or variety of *conspersus* the *A. rufescens* Barber described (1911a, 30) from Arizona, since the genitalia are the same as in the northern *conspersus*.

196 (327). *CORISCUS PILOSULUS* (Herrich-Schaeffer), 1848, 101.

Elongate, slender, depressed above, subconvex beneath. Color above variable, usually grayish-yellow, the head fuscous, with tylus and a line each side dull yellow, a narrow stripe below eye and the edge of side margins of pronotum whitish; apical third of pronotum, tips of joints 1—3 of antennæ, tips of tibiæ and tarsi fuscous or piceous-black; terminal joint of antennæ dusky; connexivum as in *eurinus*; membrane pale brown. Under surface and apical half or all of femora black with a brownish lustre, thickly clothed with appressed whitish pubescence. Antennæ with basal joint a little longer and more slender than in *eurinus*, but slightly shorter than second, third one-fourth shorter than second, fourth stouter, not as long as second and third united. Pronotum longer than wide, the sides straight and converging, the apex about two-thirds the width of base; humeri prominent, acute, slightly projecting upward; disk finely, evenly, not closely punctate; hind margin subtruncate, sinuate on sides. Elytra finely and sparsely punctate. Length, 10—14 mm.; width, 2—2.7 mm.

Common in the southern half of Indiana, less so in the northern counties, July 12—Oct. 15. Occurs with *curinus* on various flowers and foliage, especially those growing in sandy soil. On Sept. 10 and again on Oct. 15 scores were once found mating on the ground along the sandy bottom of the bed of the old Wabash and Erie Canal in Vigo County. The bouncing bet or soapwort, *Saponaria officinalis* L., grew in abundance along the banks of the canal and in summer the bug was plentiful on its foliage. Along a pathway on the sides of the high wooded knobs near New Albany it was also common and mating on Oct. 9.

Ormond, Sanford and Dunedin, Fla., Oct. 25—April 4. Frequent on weeds and grasses along the sandy margins of ponds. Van Duzee found it "common and widely distributed in Florida," and Barber records it from numerous stations. Its general range is more southern than that of *curinus*, extending from New England west to Wisconsin and Nebraska and south and southwest to Florida, Texas and California. One of the Dunedin specimens taken in December is almost wholly fuscous-black above with membrane deep black, while the general hue of another is brick-red, the membrane almost white. It is a more slender species than *curinus* and easily distinguished by the prominent acute humeri and white edges of pronotum.

V. TOLLIIUS Stal, 1870, 213.

Small oblong pubescent parallel bodied species having the head declivent, elongate-triangular, almost as long as pronotum.

tum; beak stout reaching middle coxæ, joint 2 subequal to 3 and 4 united, the third very short; antennæ half the length of body, joint 1 shorter than head, 2 and 4 subequal, 3 slightly shorter; pronotum subquadrate, slightly longer than wide, side margins straight, entire, humeri not prominent, obtusely rounded, hind margin subtruncate, not toothed; membrane reaching tip of abdomen, its veins mostly simple; apex of corium straight, oblique, its outer angle not reaching middle of membrane; elytra as wide as abdomen, connexivum not exposed; front and middle femora and all the tibiæ unarmed; hind femora moderately swollen, surpassing abdomen and with a row of stout spines beneath on outer margin; basal joint of hind tarsi more than twice as long as 2 and 3 united; claspers of male flat, approximate.

Two species are known, both occurring from the Rocky Mountains westward, and one of them recorded also from New York and Illinois.

197 (328). *TOLLIUS CURTULUS* (Stal), 1859a, 234.

Elongate-oblong, depressed above, convex beneath. Above dull yellow mottled with fuscous. Head fuscous with a median and two lateral lines reddish-yellow; antennæ greenish-yellow, the apical joint dusky; pronotum dull yellow sprinkled with fuscous dots and punctures, the apical half with two blackish median lines, divergent behind and separated by a narrow yellowish one; both pronotum and head with numerous erect blackish hairs; scutellum fuscous, the tip pale; elytra with numerous small fuscous blotches, the small sparse punctures each bearing a minute yellow appressed hair; membrane pale mottled with vague fuscous dots; under surface with sides fuscous, the middle reddish-brown; femora in great part fuscous to piceous, tibiæ and tarsi dull greenish-yellow. Structural characters as under generic heading. Length, 11—12 mm.; width, 3—3.5 mm.

Stanford University, Cal., May 14 (*Gerhard*). Recorded from New York, Illinois, Colorado, Utah, Oregon, California and British Columbia. Resembles in form and general appearance a *Catorhintha*. The New York record is that of Barber (1911a, 31), from Kingsbridge.

VI. *STACHYOCNEMUS* Stal, 1870, 215.

Small elongate-oblong pubescent and bristly species having the head declivent, triangular, strongly narrowed and much produced in front of antennæ; beak as in *Tollius*, reaching middle of mesosternum; antennæ slightly passing base of pronotum, first joint reaching apex of head, slightly longer than

either 2 or 3, which are subequal, 4 shortest, stouter, fusiform; pronotum as wide at base as long, sides straight, entire, converging from the acute humeri to apex, hind margin sinuate and with a small median tooth; corium with apex as in *Tollius*; abdomen slightly dilated at middle, connexivum narrowly exposed; membrane equalling or slightly passing tip of abdomen, its veins few, simple; hind femora clavate, surpassing abdomen, armed beneath with two rows of small curved spines; hind tibiæ longer than femora, armed with two rows of spines, those of the inner row longer than those of femora. Genital plate of male scoop-shaped, emarginate at tip, the claspers concealed. One species is known.

198 (330). *STACHYOCNEMUS APICALIS* (Dallas), 1852, 479.



Fig. 56, X 4. (After Fracker). yellow, more or less tinged with fuscous. Structural characters as under generic heading. Length, 7.5—8 mm.; width, 2—2.5 mm. (Fig. 56).

Hessville, Lake Co., Ind., Sept. 22 (*Gerhard*). Dunedin, Fla., one specimen, Dec. 15 (*W. S. B.*). Raleigh, N. Car., Oct. 10 (*Brimley*). Ranges from New York and New Jersey west and south across the United States. The types of Dallas were from St. John's Bluff, Fla., and it is recorded by Van Duzee from St. Petersburg and Estero, that State. Occurs apparently only in sandy regions, where, at times, it may be found in numbers running over the ground like a *Cicindela*. Vestal (1913, 29) says that it is common in the basin of small sand blowouts in northwestern Illinois, June—October, being one of the few characteristic basin insects of that region. The North Carolina specimen is brachypterous, the membrane reaching only to

middle of fourth segment of dorsum. Fracker (1918, 276) has given the varietal name *cinereus* to the paler form.

Family VIII. CORIZIDÆ Mayr, 1868, 121.

THE SCENTLESS PLANT BUGS.

Small or medium sized oval or oblong-oval species possessing the majority of the characters of the Coreidæ but having the head always triangular, narrowed and more or less projected forward in front of antennæ; basal joint of antennæ always shorter than head, the terminal one thicker than the second and third; apex of corium straight or nearly so; fourth dorsal segment of abdomen sinuate at middle on both the front and hind margins, or at least on the hind one, where the sinuation receives a median forward-prolonged lobe from the fifth segment; osteolar openings in our species obsolete; sixth ventral of female not slit at middle.

The species are, for the most part, of small size and pale in color and occur, often in numbers, in late summer and autumn, upon weeds and other plants growing in open fields and along the borders of woods and roadsides. The family is by Stal and Van Duzee treated as a subfamily of the Coreidæ, but by more recent writers as a distinct family. Van Duzee, in his Catalogue, recognizes three tribes, six genera and 29 species from the United States. Of these all the tribes, five of the genera and 16 of the species are represented in the eastern states. The principal available literature most useful in the study of the family is as follows: Stal, 1870, 1873; Hambleton, 1908; Baker, 1908; Torre Bueno, 1912a; Gibson, 1917a, 1919.

KEY TO TRIBES OF CORIZIDÆ.

- a.* Hind femora spined beneath; front angles of pronotum prolonged forward in an acute spine. Tribe I. HARMOSTINI, p. 270.
- aa.* Hind femora unarmed beneath; front angles of pronotum obtuse, unarmed.
 - b.* Head abruptly narrowed behind the eyes into a distinct neck; side margins of pronotum entire; general color pale; smaller, length, not over 9 mm. Tribe II. CORIZINI, p. 276.
 - bb.* Head not narrowed behind the eyes; side margins of pronotum notched near front angles; general color black with red markings; larger, 11 or more mm. Tribe III. LEPTOCORINI, p. 283.

Tribe I. HARMOSTINI Stal, 1873, 97.

Small oblong-oval species having the head porrect, broader

across the eyes than apex of pronotum; tylus longer than cheeks and compressed between them; beak passing middle coxæ, its third and fourth joints subequal; antennæ half or more the length of the body, basal joint stout, half the length of the head, second and third slender, fourth stouter and shorter, fusiform; pronotum broadest across the humeri, narrowed and somewhat declivent toward apex, side margins more or less concave, their edges recurved and with front angles acute, prolonged forward; scutellum small triangular, the clavi meeting behind its apex; front and middle legs slender, unarmed, hind ones longer, their femora clavate, armed beneath on apical half with three or four strong spines and finer spinules intervening.

Three genera are known, all occurring in the United States, two being represented in our territory.

KEY TO EASTERN GENERA OF HARMOSTINI.

- a. Pronotum without a distinct median impression between two short ridges; abdomen not dilated at middle, the connexivum concealed. I. HARMOSTES.
- aa. Pronotum with a median impression, limited each side by a short ridge; abdomen dilated at middle, the connexivum broadly exposed. II. AUFEIUS.

I. HARMOSTES Burmeister, 1835, 307.

This genus, with diagnostic characters as set forth under tribal heading and in key, is represented by 16 species, all from the New World. Of these seven occur in America north of Mexico, four in the eastern states.

KEY TO EASTERN SPECIES OF HARMOSTES.

- a. Side margins of pronotum finely toothed or crenulate.
 - b. Second and third joints of antennæ subequal; abdomen dull yellow with fuscous markings; length, 6—7 mm. 199. AFFINIS.
 - bb. Second joint of antennæ shorter than third; abdomen greenish-yellow, thickly sprinkled with reddish dots; length, 7—8 mm. 200. SERRATUS.
- aa. Side margins of pronotum entire.
 - c. Basal joints of antennæ reaching or but slightly surpassing apex of head; second and third joints subequal. 201. FRATERCULUS.
 - cc. Basal joints of antennæ surpassing apex of head about one-half their length; second joint shorter than third. 202. REFLEXULUS.

199 (340). HARMOSTES AFFINIS Dallas, 1852, 522.

Elongate-oval, subdepressed above, subconvex beneath. Above grayish-yellow, thickly marked with fuscous or reddish-brown punctures; antennæ dull yellow, apical joint in part fuscous; apical margin of scu-

tellum yellow; membrane hyaline, sparsely mottled with fuscous dots; costal edge of elytra alternated with yellow and fuscous; under surface dull yellow, the sides of abdomen, a spot at base of sixth ventral and two spots between front and middle coxæ fuscous; legs dull yellow, the apical half of hind femora fuscous vaguely mottled with paler. Antennal spines short, slightly divergent, not reaching basal third of first joint, the latter surpassing apex of head by one-half its length. Beak reaching middle of metasternum. Pronotum with humeri broadly rounded, sides rather deeply concave, margins crenulate; disk with a fine slightly raised smooth median line, elsewhere evenly not densely punctate. Scutellum similarly punctate, its margins thickened, apex rounded. Length, 6—7 mm.; width, 2—2.3 mm.

Dunedin, Ft. Myers and Key West, Fla., Nov. 22—April 1; Orizaba, Mex., Aug. 2 (*W. S. B.*). Taken by sweeping vegetation along the borders of tidewater lagoons and in low moist grounds. Recorded by Barber also from Biscayne Bay and Key Largo, and known from Texas, the West Indies and Mexico. This is the species determined by Van Duzee (1909, 161) as *affinis* Dallas, but the original description is so short and unsatisfactory that comparison with the type should be made. Dallas states that the beak "*vix ad basin pedum posticorum attingenti*," which is true of the species in hand, whereas he says of his *perpunctatus*, a synonym of *serratus*, "*rostro abdominis basin attingenti*." In Gibson's key (1917a, 441) the reverse of this is stated.

200 (335). *HARMOSTES SERRATUS* (Fabricius), 1794, 75.

Form of *affinis* but longer. Above dull yellow, thickly marked with reddish-brown punctures and sprinkled with reddish dots; membrane longer with more distinct fuscous or reddish dots; under surface yellow thickly sprinkled with small reddish dots and points; tarsi in part fuscous; color otherwise as in *affinis*. Basal joint of antennæ but little surpassing apex of head, the spines at its base longer than in *affinis*; second joint one-fourth or more shorter than third; beak reaching base of abdomen. Pronotum with humeri subacute, disk more strongly declivent and more narrowed in front than in *affinis*, finely, densely punctate and with a fine median line; side margins more deeply concave, their edge serrulate. Scutellum with apex slightly narrower, its margin less thickened. Length, 8—9 mm.; width, 2.3—2.5 mm.

R. P. Park, Fla., Dec. 12 (*W. S. B.*); one swept from roadside herbage. Brownsville, Tex., Aug. 2. (*Gerhard*). A neotropical species recorded by Uhler as occurring in Arizona, Mexico, California and Cuba, and by Van Duzee (1917, 117) only from Texas and Florida. Gibson (1917a, 444) gives its range as "Brazil, Argentina, Paraguay, West Indies, Central America and practically the entire United States." The specimens at hand are much paler than those of *affinis* from Florida.

201 (339). *HARMOSTES FRATERCULUS* (Say), 1832, 10; I, 324.

Elongate oval. Reddish-brown, often with a reddish tinge; costal margin of elytra with a row of fuscous dots; membrane hyaline with numerous similar dots; under surface and legs nearly uniform reddish-yellow, the apical third of hind femora dusky. Basal joint of antennæ short, thick, scarcely passing the acute apex of head, second very little longer than third; fourth slightly longer than first, pubescent; beak passing hind coxæ. Pronotum with humeral angles rounded, front portion rather strongly declivent, its side margins broadly concave, entire; disk with a fine median line, rather coarsely and densely punctate, each puncture, as well as those of elytra, under surface and femora, enclosing a minute yellow scale. Scutellum sparsely punctate and with a median raised line, the edges strongly reflexed. Length, 6—8 mm.; width, 2—2.3 mm.

Putnam, Posey, Perry and Crawford counties, Ind., Aug. 2—Sept. 24. Swept from flowers of boneset, *Eupatorium perfoliatum* L., and other Compositæ in marshy places. A species of southern range extending from New Jersey west through southern Indiana to Oklahoma and south to Georgia, Arizona, California, and Central America. Easily known by its entire margins of pronotum, short basal joint of antennæ, long beak and row of distinct fuscous dots along the margin of elytra.

202 (336). *HARMOSTES REFLEXULUS* (Say), 1832, 10; I, 323.

Elongate-oval. Above greenish-yellow to pale reddish-brown sprinkled with scattering fuscous or reddish dots; costal margin of elytra with a few vague fuscous points; membrane clear hyaline; under surface and legs greenish-yellow, often sprinkled with minute reddish dots, the tip of the beak, fourth antennal and tarsal claws fuscous. Antennæ as in key, the spines at base very acute, the basal joint rugose-granulate. Beak scarcely reaching hind coxæ. Pronotum with front portion but little declivent, its side margins strongly reflexed, entire, but slightly concave, humeri rounded; disk with a fine median line, the apical third finely and closely, the remainder coarsely confluent punctate. Elytra coarsely, not densely punctate, the punctures each enclosing a minute yellow bristle. Length, 7.5—9 mm.; width, 2.2—2.7 mm. (Fig. 57).



Fig. 57, X 5. (Original).

Common throughout Indiana, May 16—Jan. 13. Hibernates beneath basal leaves of mullein, half buried logs

and other cover, and in summer and autumn occurs on flowers of various Compositæ along borders of meadows and streams.

Ormond, Dunedin, R. P. Park and Sarasota, Fla.; common, Nov. 19—April 22, on weeds and low shrubs in open pine woods and about lakes and ponds. Recorded by Van Duzee as "common everywhere in Florida."

This is the most frequent and widely distributed *Harmostes* in the United States, ranging over the whole area of this country. It is recorded from Canada only from British Columbia, but doubtless occurs throughout the southern portion. Though mentioned in most of the local lists, nothing is said of its habits. In color it is quite variable, some specimens being pale yellowish-green without fuscous spots, others reddish-brown with pronotum often tinged with fuscous and elytra with numerous fuscous dots. The tylus is so convex as to be prominently elevated above the cheeks so that Say gave "head carinate before," as one of his two leading characters.

— (338). *HARMOSTES*—? *OBLIQUUS* Say, 1832, 11; I, 324.

"All above punctured; rostrum and head rather short. Body pale yellowish-rufous; head obviously punctured, not extending to tip of first joint of antennæ; antennæ, first joint robust; second hardly two-thirds as long as third; thorax with rather large punctures; no obvious transverse impressed line; hemelytra, on the corium with large separate punctures; posterior edge very oblique and elongated; membrane immaculate, undulated by the nervures; beneath more obviously tinged with rufous; feet paler; rostrum hardly reaching the intermediate coxæ. Length less than three-twentieths of an inch. It may be distinguished by the remarkable obliquity of the terminal line of the corium. Inhabits the United States."

The above is the original description of Say's *Syromastes obliquus*, which follows immediately after those of his *S. reflexulus* and *S. fraterculus*. It is not at present known to what insect the name rightfully belongs. As the three forms were the only ones placed by him in *Syromastes* it must be closely allied to the two above described, though much smaller (3.5 mm.). From his distribution note it must also have been a common species of wide range.

II. AUFEIUS Stal, 1870, 221.

Small oval species closely allied to *Harmostes* but having the eyes and ocelli less prominent; antennæ shorter and stouter, the first joint but slightly passing apex of head, second shorter

than third, fourth stouter, fusiform; beak reaching middle coxæ; pronotum much as in *Harmostes*, the margins finely crenulate, disk with a vague linear elevation each side of middle, reaching from apical to basal fourth, with an oblong shallow impression between them; abdomen rather widely inflated at middle, the connexivum broadly exposed, its margin curved; legs short, hind femora scarcely passing fifth ventral, not greatly swollen, the apical half armed beneath with fewer and smaller spines than in *Harmostes*. One species is known.

203 (341). *AUFEIUS IMPRESSICOLLIS* Stal, 1870, 222.

Oblong oval, depressed above. Pale grayish-yellow, thickly marked above with fuscous dots and punctures; head dull yellow; antennæ dusky brown; connexivum alternated with fuscous and dull yellow; membrane whitish hyaline, immaculate, not or but slightly passing abdomen; under surface and legs dull yellow, more or less mottled with fuscous and with a blackish spot behind each of the front coxæ. Head granulate-punctate, subquadrate behind the antennæ, the tylus convex. Pronotum with humeri obtusely rounded, side margins but slightly concave; disk finely and densely punctate, the hind margin subtruncate. Scutellum similarly punctate, the apex rounded with margins reflexed. Elytra in great part membranous, hyaline, the veins coriaceous, elevated, the clavi alone punctate, and only at base. Sternal pleura densely punctate; ventrals minutely transversely striate. Length, 5—6 mm.; width, 1.7—2 mm.

Marion and Vigo counties, Ind., Sept. 12—21 (*W. S. B.*). Denver, Colo., July 13; Faywood, N. Mex., June 5 (*Gerhard*). My single Marion county specimen was swept from the borders of a timothy meadow, while the Vigo County one was taken from the window of the high school building in Terre Haute. Its known range extends from Ohio west to South Dakota and Colorado and southwest to Texas, California and Mexico. Osborn and Drake (1915, 506) recorded it as taken in large numbers at Columbus, O., while sweeping grasses on the university farm. Uhler (1877, 407) swept it from bushes in the suburbs west of Denver, Colo., and says that "some of the more mature specimens were powdered beneath with a white mealy substance." The abdomen in the Indiana and New Mexico specimens at hand is thickly sprinkled with small reddish points and has two rows of irregular blackish spots on each side. In the Colorado one it is devoid of the reddish points and thickly mottled throughout with fuscous. While closely resembling some of the species of *Harmostes* it is easily recognized by the dilated abdomen and by having the elytra in great part membranous.

Tribe II. CORIZINI Stal, 1872a, 54.

Since this tribe contains only the one genus, *Corizus*, the characterization is set forth under the genus heading.

I. CORIZUS⁴⁶ Fallen, 1814, 8.

Small oval or oblong-oval pubescent species possessing the characters given under the family heading and having the head triangular, broader across the eyes than apex of pronotum, prolonged in front of antennæ and abruptly narrowed behind the eyes; ocelli separated by a space twice or more greater than their distance from eyes; antennæ less than half the length of body, without spines at base, the first joint scarcely reaching or but slightly passing apex of head; beak rarely passing hind coxæ; pronotum trapezoidal, its front portion slightly declivent, transversely impressed near apex, side margins not carinate or produced forward in front, disk with a feebly elevated median line; scutellum triangular, longer than wide; elytra in great part membranous and hyaline, only the veins, costal margin and apex of corium coriaceous and opaque; membrane usually surpassing abdomen, its veins numerous, simple; abdomen feebly dilated, connexivum narrowly exposed; metapleura usually prolonged and thinner posteriorly; osteole wanting; legs slender, unarmed.

The genus is cosmopolitan in distribution and contains many species which, on account of close similarity in structure and wide variation in color, are difficult to classify. They resemble very closely the small Lygæids of the genus *Nysius* and are by beginners often confused with them. Van Duzee recognizes 13 species and numerous varieties from America north of Mexico. Of these eight are known from the eastern states.

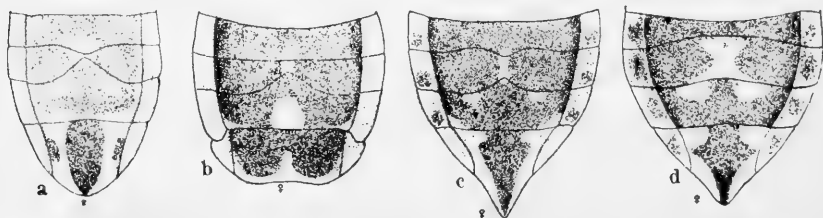


Fig. 58. Abdominal disks of females of *Corizus*. a, of *C. viridicatus*; b, of *hyalinus*; c, of *punctatus*; d, of *bohemanii*. All much enlarged. (After Hambleton).

⁴⁶McAtee & Malloch (1923, 162) state that the generic name *Corizus* Fallen (1814) is preoccupied by *Coryna* Wolff (1811, IV). They state, however, that Agassiz has an "entry to the effect that there is a *Coryna* Gartner in Pallas, *Elenchus Zoophytorum*, etc., 1766." This reference, they have been unable to find in the copy of Pallas at their command. As there may have been more than one edition of the Pallas work, I prefer to retain the name *Corizus* under which our species are well known.

KEY TO EASTERN SPECIES OF CORIZUS.

- a.* Outer hind border of metapleura not expanded and prolonged posteriorly, the hind margin subtruncate, its outer angle broadly rounded; transverse impression of pronotum ending each side in a loop.
 - b.* Connexivum spotted; length, 6.5—8.5 mm. 204. CRASSICORNIS.
 - bb.* Connexivum wholly pale (fig. 58, *a*); length, 5—6 mm. 205. VIRIDICATUS.
- aa.* Outer hind border of metapleura expanded and prolonged backward, the hind margin sinuate, its outer angle subacute or rounded; transverse impression of pronotum not ending in a loop; length rarely over 6 mm.
 - c.* Last segment of abdomen short and broad, its apex truncate in female (fig. 58, *b*), evenly rounded in male; side margins of pronotum usually distinctly paler than the disk. 206. HYALINUS.
 - cc.* Last ventral of abdomen distinctly longer, its apex acute or rounded in female, obtusely rounded in male; side margins of pronotum not distinctly paler than disk.
 - d.* Dorsum banded with black, the second and sixth segments paler; beak slightly passing hind coxæ; southern species. 207. SIDÆ.
 - dd.* Dorsum without black transverse bands; beak not passing hind coxæ.
 - e.* Connexivum pale without spots or with very faint ones; beak reaching to or almost to hind coxæ; last dorsal of female with apex obtusely rounded. 208. LATERALIS.
 - ee.* Connexivum spotted, sometimes nearly wholly dark; beak not reaching hind coxæ.
 - f.* Last dorsal of female very long (fig. 58, *c*), acutely pointed. 209. PUNCTATUS.
 - ff.* Last dorsal of female not greatly lengthened (fig. 58, *d*), its apex not acute.
 - g.* Pronotum with a whitish median calloused line; body not densely hairy; larger, length, 5—6 mm. 210. BOHEMANII.
 - gg.* Pronotum without median line; body densely clothed with long fine hairs; smaller, 3.5—4.5 mm. 211. HIRTUS.

204 (345). CORIZUS CRASSICORNIS (Linnaeus), 1758, 448.

Elongate-oval, depressed above, subconvex beneath, thinly clothed with very short pubescence. Above brownish- or grayish-yellow, usually sprinkled or clouded with fuscous; head yellow, a spot between ocellus and eye, and a stripe on basal joint of antennæ blackish; transverse impression of pronotum, small spots on nerves of elytra and one on each segment of connexivum fuscous; dorsum black, a pale spot at middle of third and fourth segments and two on the fifth, the sixth pale with a median black spot; under surface yellow, the abdomen usually mottled with fuscous and numerous minute reddish dots; legs yellow with numerous black dots. Head with vertex broad, the cheeks subconvex, reaching nearly to tip of tylus; basal joint of antennæ passing apex of



Fig. 59, Female X 5.
(After Hambleton).

head, second one-third longer than third, the latter slightly shorter than fourth. Disk of pronotum with hind angles obtusely rounded, hind lobe finely, evenly and densely punctate and with two broad obtuse longitudinal ridges separated by a shallow groove, the transverse impression of front one ending in a loop each side. Scutellum with margins feebly reflexed, apex narrowly rounded. Last dorsal of female broadly triangular, its apex rounded. Length, 6—8.5 mm.; width, 2.7—3.5 mm. (Fig. 59).

Paris, Me., June 11 (*Frost*). Sullivan Co., N. Y., Sept. 16 (*Davis*). Chimney Gulch, Colo., Aug. 27. Helena, Mont., July 7 (*Gerhard*). Not as yet recognized from Indiana but re-

corded from Ohio. Ranges from Quebec and New England west to the Pacific; not recorded in the east south of New Jersey, though known from Texas, Arizona and New Mexico. It is a cosmopolitan palæarctic species, common in northern Europe and Japan. Van Duzee recognized nine varieties, based mainly on color forms. Uhler (1876, 301) says that: "Like *C. hyalinus* and *C. lateralis* it at times becomes suffused with a red color which totally changes its appearance." In this country it has usually been recorded as *C. punctiventris* (Dall.), a synonym.

205 (344). *CORIZUS VIRIDICATUS* (Uhler), 1872, 404.

Closely allied to *crassicornis*, but more slender with sides subparallel. Pale straw-yellow, more or less tinged with green, rather thickly clothed with fine whitish pubescence; stripe on basal joint of antennæ, ocellar tubercles and line between them and eye, transverse impression and more or less of disk of pronotum and an elongate spot on sixth dorsal, usually more or less black: nervures of elytra with a few minute brown spots; femora and tibiæ with numerous small brown dots. Beak reaching hind coxæ. Ocellar tubercles very small. Disk of pronotum coarsely and rather closely punctuate. Abdomen with sides parallel, the connexivum narrowly exposed, male; slightly widened behind middle, connexivum rather broadly exposed, female. Apex of last dorsal in both sexes broadly rounded (fig. 58, a). Length, 5—6 mm.

Ft. Collins, Colo., June 17—30 (*Osborn*). Manitou, Colo. (*U. S. N. Mus.*). Recorded from District of Columbia by Barber (1914a, 171). Its general range is western, extending from Nebraska and the Dakotas to the Pacific. Uhler (1877, 407) recorded it as a variety of *hyalinus* and stated that: "It lodges in

the flowers of various weeds and seems to be common upon the plains, foothills and parks in the mountains."

206 (343). *CORIZUS HYALINUS* (Fabricius), 1794, 168.

Elongate-oblong, sparsely pubescent. Pale yellow varying to reddish or dark brown; head with an interrupted basal transverse line and some marks in front of eyes, black; antennæ dull yellow, dotted with fuscous, the basal joint usually with a black line; pronotum with transverse impression and a spot on humeri blackish, disk with fuscous punctures, the side margins usually rather broadly pale yellow; scutellum with disk blackish, the edges and tip yellow; elytra with apical nervures dotted with fuscous, the apex of corium often reddish; connexivum yellow, often with a dark spot on each segment; membrane clear hyaline, surpassing the abdomen; under surface pale yellow, the sides of abdomen often in part darker; mesosternum black at middle; legs yellow with numerous very small fuscous dots; dorsum in great part black, the margin of

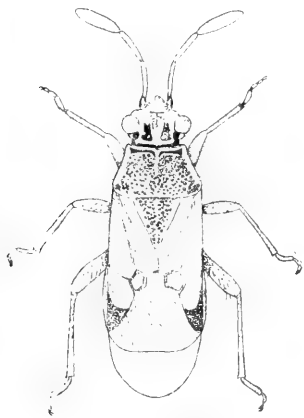


Fig. 60. Female X 7.
(After Hambleton).

the sixth segment with pale spots, male, or wholly pale, female. First joint of antennæ scarcely reaching apex of head, second and third subequal, fourth longest. Pronotum subconvex, declivent in front; transverse impression rather wide, hind angles obtusely rounded, disk finely, not densely punctate. Scutellum with a vague elevated median line, edges raised, tip narrowly rounded. Length, 5.5—6.5 mm.; width, 1.8—2.5 mm. (Fig. 60).

Marion and Knox counties, Ind.; common near Indianapolis, in all stages, Sept. 12, on weeds and grasses along a railway; probably occurs throughout the State. Dunedin and R. P. Park, Fla., Nov. 17—April 8; scarce at Dunedin on herbage along margins of citrus groves and the bay front. Recorded by Barber from five stations between Estero and Jacksonville. It also is a cosmopolitan species, known in this country from Massachusetts to Wyoming and south to Florida, Arizona and California, also from Mexico and the West Indies. It appears to be scarce in the northeastern states, having been reported only from Massachusetts, Ohio and Maryland. The usually wholly pale sides of pronotum, yellow tip of scutellum and truncate sixth dorsal of female, are the principal distinctions between it and our other species. In all but one of the specimens

at hand the connexivum is yellow or orange with black spots, in the darker individuals these spots being very prominent.

207 (346). *CORIZUS SIDÆ* (Fabricius), 1794, 169.

Oblong-oval, rather thickly pubescent. Above dull grayish-yellow to dark brown, often rather thickly sprinkled with brown or reddish dots; head sometimes with a median brownish line extending back to pronotal impression; terminal joint of antennæ in great part fuscous; dorsum with black bars across segments 3—5, these separated on connexivum by narrow pale lines; sixth segment usually wholly pale in female, with a median dark stripe, male; membrane hyaline, surpassing the abdomen, sometimes sprinkled with reddish dots; under surface yellow, thickly mottled with reddish-brown spots; mesosternum blackish at middle; femora annulate with black; tibiæ and tarsi with blackish dots. Head short, its apex bluntly triangular; basal joint of antennæ not reaching its tip, second longest, third and fourth subequal. Pronotum with basal portion convex, rather strongly declivent;

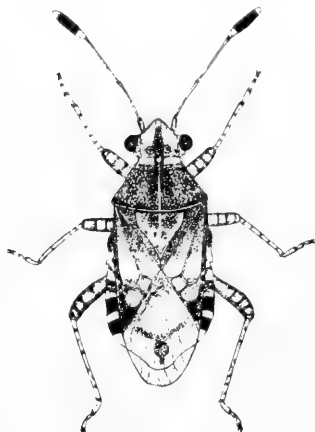


Fig. 61. Male X 7.
(After Hambleton).

sides distinctly converging, the apex two-thirds the width of base; disk finely and densely punctate, usually with scattered minute reddish tubercles, the smooth median line fine, distinct throughout. Scutellum similarly sculptured, the tip narrow. Abdomen short, dilated at middle, the connexivum relatively widely exposed. Length, 4.5—6.3 mm.; width, 2—3 mm. (Fig. 61).

Dunedin, Ft. Myers, Utopia, Royal Palm Park and Key West, Fla., Nov. 21—April 5. Frequent about Dunedin throughout the winter and spring on low herbage, especially that of the prickly sida, *Sida spinosa* L., growing in rather moist grounds. Recorded also from Crescent City and St. Petersburg, and probably occurs in numbers throughout southern Florida and more sparingly so in the northern portion. In one Dunedin example the membrane is marked with numerous red dots. It is a neotropical American species, known from Patagonia northward and recorded in this country from Maryland, Georgia, Florida, Oklahoma, Texas and Arizona. Like our other species it varies much in color but is quite easily distinguished by its relatively short broad form, dilated abdomen, long beak, banded dorsum, and in having the second antennal joint longer than either third or fourth.

208 (348). *CORIZUS LATERALIS* (Say), 1825, 320; II, 245.

Elongate-oval, depressed above, convex beneath. Pale dull yellow, often strongly suffused with reddish; antennæ yellow tinged with fuscous, the basal joint with one or two black lines; a small blackish spot behind each eye, a faint one on humeri and some fuscous dots on nerves of corium usually present; membrane clear hyaline, surpassing abdomen; connexivum yellow, rarely with a faint dark spot near front angles of each segment; dorsum pale, black at base, second segment with median black spot, third, fourth and fifth each with three or four smaller rounded or curved black spots, sixth with a median black stripe, these darker spots or stripes often reddish-brown; under surface usually uniform reddish-yellow with sternum black at middle, rarely with sides of abdomen reddish-brown; legs yellow with black dots. Antennæ with basal joint reaching apex of head, 2—4 subequal. Ocellar tubercles prominent. Pronotum relatively short, feebly declivent, disk finely and densely punctate, the transverse impression reaching the margins, the median line obvious, but very fine. Scutellum constricted near apical third, coarsely not densely punctate, its edges raised and apex subacute. Abdomen but slightly wider than pronotum, its margins subparallel; connexivum narrowly or not at all exposed. Sixth dorsal of female broadly triangular with apex rounded; of male somewhat prolonged, subspatulate. Length, 5—7.5 mm.; width, 2—3 mm.

Common in southern Indiana, March 11—Dec. 1; not taken north of Marion County though probably occurs sparingly throughout the State. Hibernates as imago beneath cover on the ground and beneath loose bark of logs and snags. In late autumn and early spring taken by sifting dead leaves and other surface debris. In May and June taken on foliage of various kinds, especially that of red-bud, *Cercis canadensis* L., along the borders of thickets and in open woodland. In late summer and early autumn found on weeds and grasses in timothy meadows and waste places.

Dunedin, Fla., scarce, March 14—28, swept from herbage in low moist grounds (*W. S. B.*). Recorded only from Sanford and Tampa, that State. Lakehurst, N. J., July 12 (*Davis*). Agricultural College, Miss. (*Wced*). Its known range extends from New England west to Colorado and south and southwest to Florida, Texas, Arizona and Mexico. Uhler (1876, 301) says that: "In Maryland it may be found by beating rank growths on the borders of woods; the first brood late in May to early in July, the second August—October. It hibernates as adult." Hambleton in an excellent account of its life history (1909, 272) states that the native food plant is a smart-weed, *Polygonum pennsylvanicum* L., which is common throughout the

range of the insect. The general pale hue, unspotted connexivum and abdomen, subequal joints of antennæ, prominent ocellar tubercles, and numerous small fuscous dots on elytral nerves are the principal distinguishing characters. The ventrals are sometimes sprinkled with numerous red dots, but never with fuscous spots and blotches. Two females at hand are 7.5 mm. in length.

209 (351). *CORIZUS PUNCTATUS* Signoret, 1859, 81.

Oblong-oval. Dark grayish-white to reddish-brown, head usually with a median blackish line; nodules of humeral angles of pronotum, some scattered oblong spots on base and near apex of scutellum and on veins of elytra, fuscous-brown; membrane clear hyaline, but slightly surpassing the pointed tip of abdomen; connexivum pale with a small black spot on each segment (fig. 58, *c*); under surface and legs greenish-yellow, the pleura and femora thickly flecked with purplish-brown points and dots; middle of mesosternum black. Antennæ with joints 1 to 3 greenish-yellow with vague fuscous lines, 1 slightly passing tip of tylus, 4 fuscous-brown. Base of pronotum one-third wider than apex, hind angles with an obtuse tubercle. Scutellum coarsely punctate, its margins raised and calloused near base and apex, the apical fourth concave. Female with sixth dorsal and ventral both long and pointed, male with apex of last dorsal rounded. Length, 4.5—5.5 mm.

Santa Rita Mountains, Ariz., Aug. 26 (*U. S. Nat. Mus.*). A neotropical species recorded from Sanford, Fla., by Van Duzee. Its general range is southwestern, extending from Texas and Arizona south to Mexico and Guatemala.

210 (349). *CORIZUS BOHEMANII* Signoret, 1859, 86.

Oblong-oval, thinly pubescent. Above dark reddish-brown to fuscous-black; head with a median blackish line; antennæ in great part fuscous, joints 3 and 4 pale at base and tip; narrow median line of pronotum and scutellum and extreme tip of the latter, pale yellow; nervures of elytra pale with black dots; connexivals alternated with black and yellow, sometimes with only a small dark spot near apical angle; membrane pale hyaline, reaching or but slightly passing tip of abdomen; dorsum dark brown or black with a pale X-shaped spot at middle (fig. 58, *d*), the last segment usually black with a pale spot each side at base and another at tip; under surface usually pale yellow or reddish-brown, the abdomen sometimes with margins fuscous and middle sprinkled with reddish or fuscous dots; legs dull yellow marked with fuscous dots. First joint of antennæ not reaching apex of head, 2 and 4 subequal, 3 slightly shorter. Pronotum but little declivent, disk finely and densely punctate, the median line distinct. Scutellum more coarsely punctate, the edges raised except at middle, tip acute, median line obsolete at base and apex. Abdomen feebly dilated at middle; connexivum narrowly exposed, male, more broadly so, female. Sixth dorsal of female broader

than long, the apex pointed; of male somewhat prolonged, the apex rounded. Length, 5—6 mm.; width, 2.5—3 mm.

Frequent in southern Indiana, May 16—Oct. 17. No specimens are at hand from the northern counties, though it doubtless occurs sparingly throughout that region. Sherborn, Mass., Oct. 24 (*Frost*). Found in autumn on weeds along the margins of meadows and roadsides, and in early summer on flowers of shrubs along the borders of thickets, especially those of the dogwood, *Cornus alternifolia* L. Probably hibernates as imago as it is sometimes found beneath logs in October. Recorded from Miami, Lakeland, La Grange, Daytona, St. Augustine and Pablo Beach, Fla., and probably occurs over the northern two-thirds of that State. Its general range is northern, extending from Quebec and New England west to British Columbia and Colorado and south and west to Florida, Texas, Arizona and California. By most American authors it has been recorded as *Corizus nigristernum* Sign., now regarded as a synonym of *C. lateralis*. About Buffalo, N. Y., Van Duzee (1894, 173) found it "abundant in fields and pastures and reaching maturity about June 15." It is darker in general hue than our other northern species and this, with the X-shaped pale mark on dorsum, distinct pale median line of pronotum and subacute apex of last dorsal of female are the principal characters for its identification.

211 (355). *CORIZUS HIRTUS* Bueno, 1912a, 217.

Oblong-oval. Dark brown, thickly clothed with suberect yellowish hairs; elytra milky white, veins of corium darker; under surface and tibiae more or less greenish-yellow. Head as broad across eyes as long, wider than front margin of pronotum, without antenniferous tubercles; antennae shorter than head and pronotum united, joint 1 shortest, reaching tip of tylus; 2 longest; 4 very stout, fusiform, longer than 3. Pronotum coarsely, densely punctate, humeral angles rounded, prominent. Scutellum broad at base, longer than head, rounded apically, constricted at middle. Elytra dimorphic, in macropterous form slightly surpassing and narrower than abdomen; in brachypterous form reaching fourth or fifth dorsal. Length, 3.5—4.5 mm.

Yaphank, Long Island, N. Y. (*Bueno*). Recorded only from New York and Massachusetts. The types were taken by Bueno in a sandy grassy spot in the pine woods near Yaphank. It is our smallest and most pubescent species.

Tribe III. LEPTOCORINI Van Duzee, 1914, 379.

The members of this tribe differ much in appearance from those of the two preceding, being large black species with red

markings. They possess the characters of the family and have the head subporrect, narrowed in front, wider across the eyes than apex of pronotum and not narrowed behind them; pronotum trapezoidal, its side margins notched just behind the front angles, the transverse subapical impression entire, reaching the margin; subapical inner cell of the corium triangular; osteole wanting; legs slender, unarmed.

The tribe comprises two genera, both of which are represented in the United States and our territory.

KEY TO GENERA OF LEPTOCORINI.

- a.* Bucculæ less than half the length of head; beak (in our species) but slightly if at all passing hind coxæ. I. LEPTOCORIS, p. 284.
aa. Bucculæ reaching base of head; beak reaching to or beyond second ventral. II. JADERA, p. 285.

I. LEPTOCORIS Hahn, 1831, 200.

Elongate-oval species of medium or large size having the head sub-convex, triangular; cheeks shorter than tylus; antennæ with basal joint less than half the length of head, third and fourth subequal, second longest; pronotum but slightly declivent, humeri rounded, transverse impression narrow, shallow, the area in front of it scarcely elevated, the anteapical notch on margin small; apical margin of corium straight, oblique; membrane passing tip of abdomen, its veins very numerous, mostly simple; sixth ventral of female somewhat prolonged, its apex rounded.

Numerous species are known from the tropical regions of the Old World, but only one from America.



Fig. 62, X $2\frac{1}{2}$.
 (After Howard).

212 (356). LEPTOCORIS TRIVITTATUS (Say), 1825, 322; II, 246.

Elongate-oval, depressed above, subconvex beneath. Above fuscous-black, very finely pubescent, subopaque; ocelli, narrow median line and broader marginal stripe of pronotum behind transverse impression, also its hind margin very narrowly, clear red; costal and apical margins and usually the nervures of elytra, dorsum and inner wings, red or in part orange yellow; membrane fuscous; under surface fuscous-black, the margins and middle of abdomen, the sides of

sternal pleura and the coxæ, red; eyes brown. Head and pronotum minutely granulate-punctate, the latter with elevated narrow median line behind the transverse impression; beak reaching hind coxæ, joint 1 as

long as head, 3 and 4 subequal, 2 longest. Scutellum and elytra similarly punctate, the tip of the former very narrow, subacute. Other characters as under generic heading. Length, 11—13.5 mm.; width, 3—4 mm. (Fig. 62).

Genoa, Nebr., Jan. 30 (*Davis*). Gila River, N. M.; Milpitas, Cal., and Pullman, Wash., April 20—Aug. 5 (*Gerhard*). Known as the "box-elder plant bug," and ranges from Pennsylvania and District of Columbia west to British Columbia, Colorado and Utah. Known also from Arizona and California. Not as yet recognized from Indiana, but doubtless occurs, as Osborn and Drake (1915, 506) mention it from numerous Ohio localities, it having first appeared in that State in 1913. Much has been written about it in economic literature, and Howard (1898) says:

"It breeds frequently in enormous numbers upon the box-elder, *Acer negundo* L., becoming more numerous in the autumn than at other seasons. The bugs congregate in groups upon the trunks of these trees, and migrate in search of hibernating quarters to fences and the sides of houses, frequently entering houses and other buildings and stowing themselves away for the winter in protected places. They suck the juices of the leaves and more tender growth of the box-elder tree, and have been reported as damaging fruit, such as peaches, plums and apples.

"During the winter the adult insect hibernates in all sorts of sheltered localities. It is especially abundant on fences, in crevices between the stones of stone walls, and in the angles of stone buildings. When spring opens and the buds of the box-elder begin to burst they scatter from their hibernating places and seek their food plant. The eggs are laid normally upon the food plant, in the crevices of the bark, but the instinct of the mother bug is by no means true, since she will oviposit in almost any situation, frequently even laying eggs in her hibernating quarters. Few of the young hatching from such eggs will ever reach a suitable tree. The first adults begin to appear after mid-summer and at this time bugs of all sizes begin to congregate in lines up and down the trunks and branches of the trees. They may frequently be seen crowding in a broad line extending from the ground up to the secondary branches, in a company including larvæ of all sizes, pupæ, and fully matured individuals. When the leaves drop, practically all are full grown and they fly away in search of winter quarters."

II. JADERA Stal, 1862, 59.

Elongate-oval species of medium or large size having the head subdepressed, slightly declivent; cheeks convex, longer than tylus; antennæ with basal joint shorter than head, 2 slightly longer than either 3 or 4, which are subequal;

beak reaching or surpassing second ventral, all the joints subequal in length, joint 1 surpassing hind margin of head; pronotum with side margins thickened, reflexed, ciliate, antemedian impression wide and deep, the area in front of it elevated; scutellum as in *Leptocoris*; elytra dimorphic, membrane usually passing tip of abdomen, its veins few and forked; legs slender, unarmed; sixth ventral of female truncate.

Seven species are known, all neotropical, three of them extending northward into the United States and two occurring in our territory.

KEY TO EASTERN SPECIES OF JADERA.

- a.* Body above black; pronotum with a distinct median longitudinal carina. 213. *HÆMATOLOMA*.
- aa.* Body above grayish to reddish-fuscous, sprinkled with fuscous dots; pronotum with median carina very fine or wanting. 214. *SANGUINOLENTA*.

213 (357). *JADERA HÆMATOLOMA* (Herrich-Schaeffer), 1848, 103.

Elongate-oval, depressed above, subconvex beneath. Above black, subopaque, finely pubescent; eyes and their orbits, ocelli and broad side margins of pronotum a clear red; antennæ black, with erect hairs; under surface usually fuscous, the sixth ventral, genitalia and margins of abdomen and sterna, red; sometimes almost wholly red beneath; legs black with erect hairs. Head and pronotum granulate-punctate, the granules bearing short erect black hairs; head with a median impressed line and pronotum with a median carina on the hind portion. Elytra minutely rugose and granulate. Membrane finely granulate between the veins, sometimes shorter than abdomen. Length, 10—14 mm.; width, 3—4 mm.

Chicago, Ill., Sept. 6; Mobile, Ala., Dec. 26; Brownsville, Tex., July 24 (*Gerhard*). Everglade and Chokoloskee, Fla., May 12—Sept. 1 (*Davis*). Recorded by Barber from four other stations in southern Florida. Outside of that State it has been heretofore recorded in this country only from Kansas, Colorado, Texas, Arizona and California, though known from Colombia, Mexico and Cuba. The Chicago specimen was taken near the observatory in Washington Park and was perhaps adventive. The Mobile specimens are brachypterous with membrane very small.

214 (358). *JADERA SANGUINOLENTA* (Fabricius), 1785, 721.

Elongate-oval. Upper surface fuscous-brown, thickly clothed with short appressed grayish hairs and sprinkled with fuscous dots; orbits of eyes, under surface of head and reflexed side margins of pronotum red; narrow costal margin of elytra pale yellow; membrane pale brown.

the veins darker; antennæ, beak and legs brown; under surface red, pubescent as above and flecked with fuscous or red dots. Fuscous dots of upper surface each bearing a short erect brown seta. Pronotum with thickened side margins narrower and more strongly reflexed and transverse groove more shallow than in *hæmatoloma*. Membrane of elytra long, in male surpassing abdomen by one-half its length. Length, 11—12 mm.

Brownsville, Tex. (*U. S. Nat. Mus.*). A neotropical species, recorded by Van Duzee (1917, 127) from Florida, but no other mention of its occurrence in that State can be found. Ranges south through the West Indies to Brazil. Stal (1870, 227) mentions a variety with elytra abbreviated and membrane rudimentary. The description of *Jadera æola* (Dallas) (1852, 463) differs in no particular from that of *sanguinolenta*, and his name is very probably a synonym.

Family IX. ARADIDÆ Spinola, 1840, 157.

THE FLAT-BUGS.

Brown or blackish Heteroptera of small size and oval, strongly flattened form, having the head porrect; tylus prominent, convex above, concave beneath to receive and protect the setæ of the mouth parts; ocelli absent; eyes prominent; antennæ 4-jointed, usually shorter than head and pronotum united; beak 4-jointed, lying in a groove between the bucculæ, the first joint very short; pronotum varying in shape, its disk with usually two or more carinæ; clavi narrowed toward apex, rarely exceeding the tip of scutellum, the latter usually elongate-triangular or subpentagonal; membrane with few or sometimes (*Pictinus* and *Ancurus*) no veins; abdomen much broader than the wings, with usually its disk only covered by the elytra; osteola rarely visible; tarsi 2-jointed, without arolia.

These insects, like the cockroaches, have become strongly adapted for a life beneath the closely fitting bark or in the narrow crevices of wood, especially that of trees which have recently died or have been felled but a year or two. They are for the most part gregarious, living in small colonies comprised of both adults and nymphs in various stages. When uncovered they remain quiescent for a long time, depending seemingly upon their hues of wood-brown or gray to shield them from discovery. In our northern states they hibernate in both the mature and nymph stages, often protected only by the shelter of bark. Here they are oftentimes frozen solid for weeks, only

to revive and become active again when the halcyon days of spring roll round once more. They then evidently fly in search of a mate or a new home, as on several occasions I have taken them by sweeping woodland herbage during April and May. Their food is supposed to be the minute fungi and molds which grow between the bark and the wood of those trees and stumps in which there is yet enough sap to promote the growth of such vegetation.

About 300 species of the family are known from all parts of the world. Of these Van Duzee (1917) lists 59 from North America, and a dozen or more have since been described. The most available literature treating of our eastern forms is by Say, 1832; Uhler, 1871, 1878; Stal, 1873; Bergroth, 1892, 1906, 1913; Heidemann, 1901, 1904; Osborn, 1903; Parshley, 1921. The family name Aradidæ is derived from that of the typical genus, *Aradus* Fab., founded in 1803 and named after an ancient city of Syria. The family is subdivided by recent writers into three subfamilies, two of which are represented in North America and our territory, the other, *Isoderminæ*, in Chile, Patagonia and Tasmania.

KEY TO NORTH AMERICAN SUBFAMILIES OF ARADIDÆ.

- a.* Prosternum with a distinct median sulcus; beak (except in *A. niger*) reaching onto or surpassing the prosternum; head narrowed behind the eyes, the latter projecting beyond the cheeks; elytra not confined within the boundaries of the disk of abdomen; trochanters connate with the femora; abdominal spiracles placed near the basal margin of each segment

Subfamily I. ARADINÆ, p. 288.

- aa.* Prosternum without a sulcus; beak not passing hind margin of head; head wider just behind eyes than in front of them, the eyes not projecting; elytra confined within the boundaries of disk of abdomen; trochanters free; spiracles placed at equal distances from basal and apical margins of segments.

Subfamily II. MEZIRINÆ, p. 316.

Subfamily I. ARADINÆ Amyot & Serville, 1843, 306.

This subfamily, distinguished mainly by the characters given above, comprises only the single genus.

I. ARADUS, Fabricius, 1803, 116.

Species of medium or small size and rough or granulate upper surface having the antenniferous tubercles prolonged in a spine and often toothed on outer side; eyes strongly projecting; beak,

except in *niger*, reaching or surpassing front coxæ; first joint of antennæ short, thick, narrowed at base; pronotum wider than long, margins usually reflexed, disk with six carinæ, the outer one on each side very short; scutellum large, elongate-triangular or sub-pentagonal, its margins and base usually elevated; elytra shorter and narrower than abdomen, the membrane with three or four oblique veins; connexivum broadly exposed; under surface more or less convex; coxæ, especially the front ones, less widely separated than in the *Mezirinæ*. Males with genital segment large, convex and bearing a lobe each

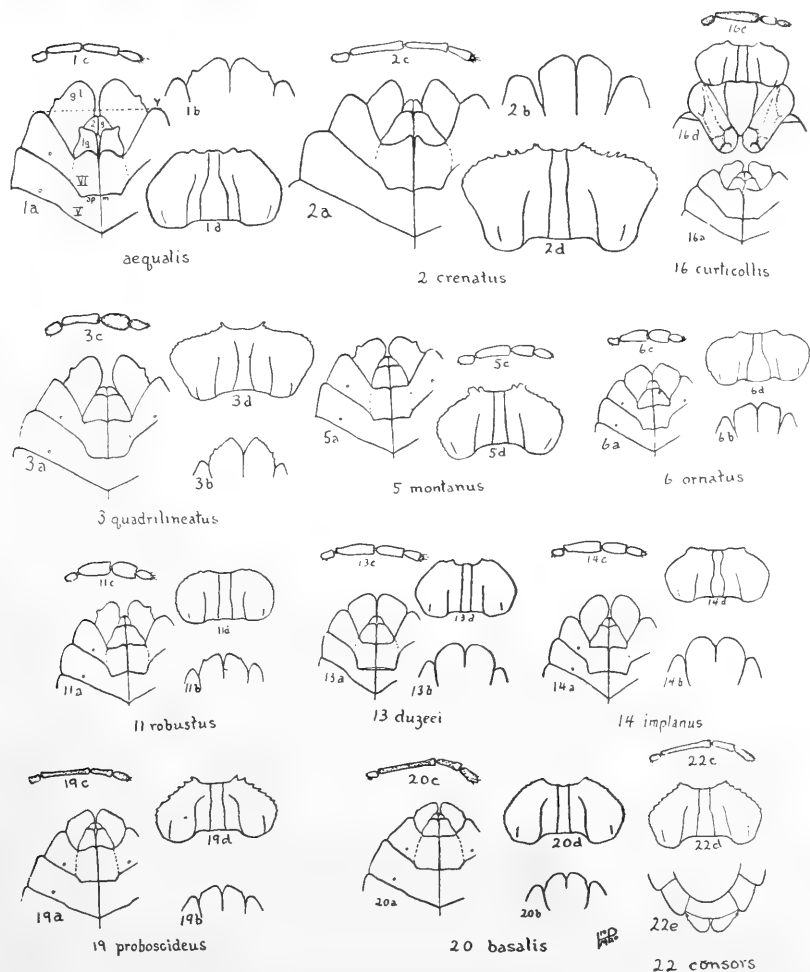


Plate I. STRUCTURES OF ARADUS.

a, Ventrals V and VI and genitals of female; b, genitals of male, terminal portion only; c, antenna; d, pronotum and sometimes the adjacent parts; e, dorsal view of hind part of abdomen, female; g. l. genital lobes. (After Parshley).

side; females with two visible genital segments, the first with a lobe each side partly visible from above, the second much smaller, terminal, not visible from above.

The members of this genus are more numerous in the northern countries of the world than are those of the *Mezirinæ*, the main distribution of the latter being in the tropics. Brachypetrous forms of a number of species are known. About 60 species of *Aradus* are known from North America, 33 species and three varieties from our territory. For convenience of treatment they are separated into seven groups.

KEY TO GROUPS OF EASTERN SPECIES OF ARADUS.

- a. Beak extending back of base of head; side margins of pronotum more or less explanate.
- b. Median carinæ of pronotum distinct, usually extending to front margin; antennæ longer than head.
- c. Second antennal segment but slightly longer than third, both slender and cylindrical; length 8 or more mm. GROUP I, p. 290.
- cc. Second antennal segment generally distinctly longer than third, one or both often not cylindrical.
- d. Third antennal segment about one-half thicker than second, the latter with apical third or more pale (fig. 3c)⁴⁷; length, 7.5—9 mm. GROUP II, p. 292.
- dd. Third antennal segment slightly if at all thicker than second.
- e. Antennæ very robust, at the widest point distinctly thicker than front femora (figs. 6c—16c). GROUP III, p. 293.
- ee. Antennæ more slender, often cylindrical, not or but slightly thicker than front femora (figs. 19c—22c).
- f. Side margins of pronotum distinctly serrate, never deeply sinuate (figs. 26d—36d); corium always strongly dilated at base, its sides never straight. GROUP IV, p. 297.
- ff. Side margins of pronotum entire, evenly granulated or very rarely denticulate, often deeply sinuate (figs. 39d—53d); corium either dilated at base (the lateral margin sinuate) or not so dilated. GROUP V, p. 306.
- bb. Median carinæ of pronotum but slightly developed, obsolete in front; antennæ scarcely longer than head, very robust, the third segment not twice as long as first (fig. 55c); length, less than 4 mm. GROUP VI, p. 314.
- aa. Beak not reaching base of head; pronotum more or less distinctly trapezoidal, the side margins not explanate. GROUP VII, p. 315.

GROUP I.—ARADUS.

This group comprises two of our larger eastern species having the antennæ slender, second and third joints cylindrical, subequal in length.

⁴⁷The figures cited in the keys and descriptions of the genus *Aradus* mostly refer to those on Plates I, II and III, occurring on pages 289, 300, and 306.

KEY TO EASTERN SPECIES OF GROUP I, ARADUS.

- a.* Side margins of abdomen almost entire; pronotum widest slightly behind the middle. 215. *ÆQUALIS*.
aa. Side margins of abdomen strongly crenate; pronotum widest in front of middle. 216. *CRENATUS*.

215 (360). *ARADUS ÆQUALIS* Say, 1832, 29; I, 352.

Oval. Wood-brown to fuscous; reflexed margins of pronotum, basal expansions and veins of corium, margins of scutellum at middle, hind margins of connexival segments and a few spots on membrane dull yellow; legs yellow, the femora and tibiæ brown at middle; antennæ with first joint and basal portion of second and third dull yellow. Head as long as broad across the eyes, granulate above; tylus short, blunt, cylindrical; antenniferous spines rather stout, acute, feebly divergent; antennæ cylindrical, joint 2 slightly longer than 3, the latter twice the length of 4; beak reaching behind front coxæ. Pronotum with side margins broadly reflexed, their edges finely crenulate; disk with median carinæ strongly elevated in front of middle. Scutellum elongate-triangular with short median basal carina. Elytra with corium broadly expanded at base, its edge crenulate. Connexivum broadly exposed, its margin entire. Male with sixth ventral twice as long as fifth, the elytra extending nearly to its tip; female with elytra reaching base of dorsal genital segment, the hind margin of the broad lobes of this segment obliquely truncate. Length, 8.2—10 mm. (Pl. I, fig. 1).

Southern half of Indiana, scarce, April 3—Aug. 13; not taken north of Putnam County. Ranges from Quebec and New England west to Illinois and southwest to Oklahoma and Texas. While Say's types were from Indiana it appears to be a rare species in this State, as I have taken only half a dozen adults in 40 years. The published records elsewhere are few. The *A. duryi* Osborn (1903, 39) described from a Cincinnati specimen, is a synonym.

216 (379). *ARADUS CRENATUS* Say, 1832, 28; I, 350.

Broadly oval; thickly and coarsely granulate above. Dull brownish-yellow or pale brown with fuscous markings on pronotum, scutellum and connexival segments; membrane with two or three oblique fuscous lines or blotches; antennæ and legs yellowish, the femora and tibiæ annulate with brown. Head as long as pronotum, a little longer than wide; tylus short, broad, obtuse; antenniferous tubercles, stout, feebly divergent; impressions of vertex short, deep, curved; antennæ slender, cylindrical, joint 2 slightly longer than 3, the latter one-half longer than 4; beak reaching front coxæ. Pronotum with side margins widely expanded and reflexed, their edges with irregular teeth; disk with median carinæ nearly evenly elevated throughout, the others distinct only on basal half. Scutellum rather broadly triangular, strongly tapering, margins strongly elevated, apex acute. Elytra with corium moderately expanded at base, thence narrowed to apex. Connexivum broad-

ly exposed, the segments separated by a notch causing the obtusely crenated appearance of abdomen. Male with fifth and sixth ventral segments subequal in length, genital segment carinate, its lobes long, the elytra reaching their base; female with abdomen wider, the dorsal genital segment semicircular, its hind margin squarely truncate, the elytra reaching its base. Length, 8—11 mm. (Pl. I, fig. 2).

Southern half of Indiana, frequent, Feb. 20—Nov. 17; not taken north of Henry and Marion counties. West Point, N. Y., June 18 (*Davis*). Hibernates in all stages beneath logs and chunks whose sides are deeply buried in sand and mold. Occurs in summer beneath bark of oak, soft maple, tulip, sycamore, etc., more frequently in damp localities along the margins of streams and ponds. The known range of this, our largest eastern species, is a wide one, extending from Quebec and New York west and northwest to Michigan and Illinois, and south and southwest to Georgia, Alabama and Mexico. It is also known from western Europe and the Palæarctic Region. Say in his original description says the fourth joint of antennæ is "a little longer than third," whereas it is but little more than one half as long.

GROUP II.—ARADUS.

This group comprises only the single species.

217 (361). *ARADUS QUADRILINEATUS* Say, 1825, 326; II, 249.



Fig. 63. X 7. (After Drake, Tech. Publ. No. 16, N. Y. St. Coll. For.).

Broadly oval, finely and densely granulate above. Dark brown or fuscous; apical third of second antennal segment and posterior angle of each connexival segment, yellowish; membrane fuscous, mottled with whitish; tibiæ yellowish, annulate with darker. Head slightly longer than wide; tylus stout, cylindrical, obtuse; antenniferous tubercles slightly divergent, subacute; impressions of vertex deep, oblong, parallel; antennæ stout, second joint nearly one-half longer and more slender than third, fourth two-thirds the length of

third; beak reaching middle of front coxæ. Pronotum with side margins widely flattened, but feebly reflexed, their edges finely dentate; disk with four carinæ almost entire, well elevated, the outer pair almost obsolete. Scutellum elongate-triangular, its sides strongly elevated. Elytra with base of corium moderately expanded, finely dentate. Con-

nexivum broadly exposed, its margins but feebly crenate. Male with fifth and sixth ventrals subequal in length, the membrane reaching apical angles of sixth; female with elytra extending to base of dorsal genital segment, the latter with hind margin slightly emarginate at middle. Length, 7.5—9 mm. (Fig. 63 and Pl. I, fig. 3).

Occurs throughout Indiana, more frequent in the northern counties, March 11—Aug. 24. DeBruce and West Point, N. Y. (*Davis*). Ranges from Quebec and New England west to Minnesota and Edmonton, Alberta, and south and southwest to Florida and Panama. In Indiana it occurs mainly in crevices of freshly sawed oak and beech stumps and hibernates beneath logs. The only Florida record is that of Bergroth (1892, 335) without definite locality. Easily known by its dark color and peculiar structure and color of antennæ.

GROUP III.—ARADUS.

This group comprises species of medium size and oval form, having the antennæ very stout, the second joint distinctly longer than third; corium strongly dilated at base. To it belong five of our eastern species.

KEY TO EASTERN SPECIES OF GROUP III, ARADUS.

- a.* Pronotum with three polished black areas behind the middle; head and pronotum dark, strongly contrasting with the pale elytra and abdomen. 218. ORNATUS.
- aa.* Pronotum without smooth black areas; color more uniform.
- b.* Third antennal segment concolorous or pale at apex only; body brownish; pronotum as long as or longer than head.
- c.* Scutellum subpentagonal, its sides scarcely elevated behind middle; color usually almost uniform brown. 219. ROBUSTUS.
- cc.* Scutellum triangular, its sides elevated throughout; color usually variegated, sides of pronotum granulated.
- d.* Pronotum widest behind middle, its median carinæ nearly parallel; first antennal pale. 220. DUZEEL.
- dd.* Pronotum widest at middle, its median carinæ sinuate; first antennal concolorous with the others. 221. IMPLANUS.
- bb.* Third antennal segment largely yellow; body black; pronotum only two-thirds as long as head; abdomen almost circular. 222. CURTICOLLIS.

218 (365). ARADUS ORNATUS Say, 1832, 29; I, 352.

Oval, granulate on head and pronotum. Dark brown; elytra and abdomen yellowish-white, tip of clavus dark; basal third of pronotum with polished chocolate-brown spots between the carinæ; legs dull yellow, the femora and tibiæ with a broad dark ring near middle. Head a little broader than long, tylus short, slightly tapering; impressions of

vertex short, triangular; antennæ very stout, shorter than head and pronotum united, second joint subclavate, one-half longer than third, fourth less robust and about half the length of third; beak reaching front coxæ. Pronotum with side margins broadly rounded, but slightly reflexed, their edges crenulate; median carinæ well elevated, divergent on basal half to surround the median polished spot; remaining carinæ indistinct. Scutellum broadly triangular, as long as pronotum, sides elevated; disk with basal transverse granulate carina, beyond which are numerous minute transverse wrinkles. Basal dilation of corium, broad, semicircularly rounded, its edge dentate. Connexivum broadly exposed, moderately reflexed. Male with fifth and sixth ventrals subequal, genital segment strongly convex, its lobes short, the elytra extending to their middle; female with elytra reaching middle of dorsal genital segment, the hind edge of the latter straight. Length 5—6.2 mm. (Pl. I, fig. 6).

Vigo Co., Ind., March 28; a single male taken from beneath bark of an oak log. Say's types were from this State. Of it he says: "Resembles *quadrilineatus* but the polished thoracic spots and the much more prominent and rounded humerus, not to mention its coloring, readily distinguish it." As his types were destroyed it was, on account of its scarcity, for a long time unrecognized. Bergroth (1892, 332, 334) mentioned a specimen from Pennsylvania, and pointed out the differences between it and both *duzei* and *robustus*. Osborn (1903a, 22) recorded three specimens taken by Dury at Cincinnati, Ohio. It is known at present only from the states mentioned and from Maryland, Virginia and the District of Columbia.



Fig. 64, X 9. (After Lugger).

219 (362). *ARADUS ROBUSTUS* Uhler, 1871, 104.

Oblong-oval, male, broadly oval, female, thickly clothed above with large, dense flattish granules. Dark ash-gray or dark brown, veins of corium and the membrane often paler; tibiæ annulate with pale rings. Head slightly broader than long; tylus cylindrical, obtuse; antenniferous spines large, stout; antennæ very robust, densely clothed with suberect scales, second joint one-half longer than third, fourth more slender, fusiform, one-half the length of third, its tip pale; beak reaching hind border of front coxæ. Pronotum widest at middle, side

margins broadly rounded, but slightly reflexed, their edges finely irregularly dentate; disk with median carinæ entire, lateral ones shortened and curving inward. Scutellum, subpentagonal, its sides parallel to middle, then converging to apex; disk feebly transversely elevated at base. Basal expansion of corium long, narrow, dentate. Connexivum broadly exposed, its margin crenate. Male with fifth ventral slightly shorter than sixth, genital segment short, strongly convex, elytra reaching nearly to tip of abdomen; female, elytra reaching to base of dorsal genital, the hind margin of latter slightly emarginate. Length, 5.5—7 mm. (Fig. 64; Pl. I, fig. 11).

Frequent throughout Indiana, Feb. 15—July 10. Staten and Long Islands, N. Y., May—June (*Davis*). Lives and hibernates beneath bark of red and black oaks. Ranges from Quebec and New England west to Nebraska and North Dakota, and south and southwest to Florida, Oklahoma and Texas. Parshley (1921, 41) mentions it from Jacksonville, Fla., this being the only record for that State. He also describes a color variety, *insignis*, from Texas, North Carolina, Michigan, etc. It has the "narrow postero-lateral margins of pronotum, apex of scutellum and most of corium yellowish; abdomen reddish-brown above."

220 (364). ARADUS DUZEEI Bergroth, 1892, 333.

Oblong-oval; head, pronotum and scutellum thinly granulated. Dark brown, variegated with dull yellow; first antennal joint and beak pale; apex of scutellum, veins, inner part of basal expansion and more or less of disk of corium dull yellow; hind margins of connexival segments and wide inner margin of genital segments yellowish; legs pale, the tibiæ and tarsi often with a broad dusky ring. Head as wide as long; tylus narrow, compressed, tapering but obtuse; antenniferous spines stout, divergent; impressions of vertex deep, oblong; antennæ stout, cylindrical, as long as head and pronotum united, second joint one-third longer than third, the latter twice as long as fourth; beak reaching front coxæ. Pronotum with side margins thickened, broadly reflexed, their edges granulate; disk with median carinæ entire, the others confined to basal half. Scutellum elongate-triangular, longer than pronotum, sides straight, converging from the base, moderately elevated. Basal expansion of corium prominent, semicircular. Connexivum broadly exposed, its margins almost entire. Male with fifth ventral shorter than sixth, genital segment short, very convex, its lobes long, elytra reaching their middle; female with abdomen broader, hind margin of dorsal genital straight, elytra reaching base or middle of genital lobes. Length, 6—6.7 mm. (Pl. I, fig. 13).

Marion and Lawrence counties, Ind., scarce, April 29—June 14. Taken from beneath bark of dead beech and maple trees, and swept from vegetation in low alluvial soil. Ranges from

Quebec and New England west to Indiana, Van Duzee's California records (1917, 130) being based upon his *apicalis*, a western species since described. Resembles *ornatus* closely but lacks the polished spots on base of pronotum. Other differences between the two are pointed out by Bergroth (1892, 334) as follows: "In *ornatus* the head is shorter, second joint of antennæ more incrassated toward apex; thorax shorter, more transverse with greatest breadth at middle; scutellum shorter, more widened at base, the apex entirely black; basal part of corium more dilated; genital lobes with basal half (not inner half as in *duzcei*) yellow."

221 (—). *ARADUS IMPLANUS* Parshley, 1921, 45.

Elongate-oblong. Pale brown, head and pronotum somewhat darker, the latter with a yellowish area behind each apical angle, corium and membrane fuscous toward tips; connexivals fuscous, the apical third of each paler; legs pale brown, femora vaguely annulate with yellow near base and apex; under surface brownish-yellow, finely and densely granulate. Head as broad across eyes as long; tylus and antenniferous spines stout, obtuse, the former with sides flattened. Antennæ as in fig. 14c, stout, covered with flattened scales, joint 1 scarcely reaching middle of tylus, 2 slightly clavate, almost as long as width of head across eyes, 3 as thick as and one-half the length of 2, 4 fusiform, two-thirds as long as 3. Beak reaching tips of front coxæ. Pronotum widest at middle, sides broadly obtusely rounded, strongly reflexed, their margins granulate; disk with two median carinæ percurrent, four lateral ones abbreviated. Scutellum slightly longer than pronotum with sides elevated, densely granulate. Basal expansions of corium rather large, reflexed, with edges granulate. Genital segments of male and female as in fig. 14, *b* and *a*. Length, 5.8—6.3 mm. (Pl. I, fig. 14).

Funk's Grove, Ill., April 30 (*Ill. Nat. Hist. Surv. Coll.*). Recorded from Indiana by Parshley; also from Ontario, Pennsylvania and Michigan.

222 (368). *ARADUS CURTICOLLIS* Bergroth, 1913, 2.

Broadly-oval. Black, finely granulated; membrane brown; front and middle tibiæ paler at middle. Head as long as broad, much longer than pronotum; tylus short, broad, slightly widened apically; antenniferous spines slender, slightly divergent; eyes very prominent. Beak reaching between front coxæ. Antennæ rather slender, as long as head and pronotum united, joint 1 reaching apical third of tylus, 2 subclavate, almost as long as width of head across eyes, 3 and 4 subequal, united two-thirds the length of 2. Pronotum rather flat, nearly three times wider than long, sides broadly rounded, their margins entire; carinæ moderately elevated, median pair percurrent, the outer ones very short. Scutellum nearly one-third longer than pronotum, sides feebly elevated, basal half of disk with obtuse median elevation. Elytra di-

morphic, reaching apical lobes of abdomen, macropterous form, only to middle of third dorsal, brachypterous one. Genital structure of female as in fig. 16, *a*. Length, 5.8—6 mm. (Pl. I, fig. 16).

Known only from Southern Pines, N. Car. and Marietta, Ga.

GROUP IV.—ARADUS.

This group comprises rather elongate species having the antennæ slender, second joint distinctly longer than third; front side margins of pronotum more or less serrate; corium always strongly dilated at base, never straight laterally. Eleven of our eastern species and one variety belong here.

KEY TO EASTERN SPECIES OF GROUP IV, ARADUS.

- a*. Third antennal almost three-fourths as long as second; color uniform dull black; length, 8.3 mm. 223. MONTANUS.
- aa*. Third antennal about one-half as long as second, often less.
 - b*. Second antennal cylindrical, longer than head; length, 8.5—11.5 mm. 224. DEBILIS.
 - bb*. Second antennal shorter than head.
 - c*. Second antennal cylindrical, at least from near base to middle; sometimes slightly enlarged near apex.
 - d*. Third antennal with apical two-thirds pale; disk of pronotum strongly elevated before and behind the transverse depression; length less than 6.8 mm. 225. CINCTICORNIS.
 - dd*. Third segment at most with apex narrowly pale; disk of pronotum rather flat, the transverse depression slight and ill-defined.
 - e*. Pronotum widest well behind the middle; sides of abdomen entire or notched.
 - f*. Granulation of head rough; length of second antennal segment subequal to width of head, including one eye; front side margins of pronotum straight, oblique and with variably coarse teeth: form elongate. 226. PROBOSCEDEUS.
 - ff*. Granulation of head smooth; length of second antennal segment equal to width of head including both eyes; sides of pronotum slightly curved and with very fine, irregular teeth; form broad. 227. BASALIS.
 - ee*. Pronotum widest at middle; sides of abdomen rather strongly crenate. 228. CONSORS.
 - cc*. Second antennal segment distinctly clavate, gradually enlarging from near base to apex, rarely (fig. 36*c*), suddenly enlarged in apical third.
 - g*. Length of second antennal subequal to distance between eyes.
 - h*. Third antennal yellowish except at base; membrane hyaline, often faintly maculate; apical angles of connexival segments pale. 229. SIMILIS.
 - hh*. Third antennal concolorous; membrane dark with pale basal spot, rarely entirely pale; general coloration nearly uniform dark brown. 229a. var. CENTRIGUTTATUS.

gg. Length of second antennal equal to width of head, including one eye.

i. Second antennal less than three times as long as third.

j. Color blackish-brown, with obscure whitish or yellowish markings; front side margins of pronotum with a few coarse teeth; second antennal strongly clavate, as long as width of head, including both eyes. 230. ACUTUS.

jj. Color black; pronotal margins with numerous fine teeth; second antennal moderately clavate, shorter. 231. SHERMANI.

ii. Second antennal distinctly more than three times the length of third.

k. Second antennal gradually enlarged from near base; third antennal thicker than second at middle (fig. 33*c*).

232. INORNATUS.

kk. Second antennal cylindrical from base to near middle, strongly enlarged in apical third (fig. 36*c*). 233. APPROXIMATUS.

223 (374). ARADUS MONTANUS Bergroth, 1913, 1.

Oval. Dark brownish-black; antennæ and legs of the same hue. Head as long as broad, slightly longer than pronotum; tylus rather short, stouter toward base; antenniferous spines short, conical, divergent, with a small tooth on outer side. Antennæ as in fig. 5*c*, moderately robust, shorter than head and pronotum united, joint 1 reaching apical third of tylus, 2 almost as long as width of vertex, two and a half times longer than 1, 3 and 4 united subequal in length to 2, 4 narrower and shorter than 3. Beak reaching between front coxæ. Pronotum rather flat, widest at middle, where it is twice as broad as long at middle, side margins irregularly and finely crenulate; disk with sides slightly reflexed, carinæ feebly elevated, median pair percurrent, others shorter. Scutellum one and three-fifth times the length of pronotum, sides straight converging to apical third, thence rounded to apex, basal half with a low median longitudinal carina. Elytra, female, reaching middle of dorsal genital plate; corium moderately dilated and reflexed at base. Abdomen rather broad, oblong-oval, widest at fourth dorsal. Genital segments as in fig. 5. Length, 8—8.3 mm. (Pl. I, fig. 5).

Known only from Quebec, Can., and Leadville, Colo.

224 (373). ARADUS DEBILIS Uhler, 1876, 322.

Elongate-oval. Head, middle of front lobe and margin of hind lobe of pronotum and entire scutellum dark reddish-brown; sides of pronotum and elytra brownish-yellow mottled with fuscous; connexivum finely mottled, the segments dark at base: membrane whitish, thickly flecked with darker spots; legs and front portion of beak reddish-brown, apex of tibiæ paler; apical third of beak and sterna fuscous-brown; ventrals reddish-brown, finely mottled. Joints 1 and 2 of antennæ reddish-brown, 1 stout, subcylindrical, not reaching middle of tylus; 2 slender, cylindrical, five times as long as 1; 3 yellowish, its base darker, about one-third as long as 2; 4 dark brown, subfusiform, pointed, two-thirds the length of 3. Beak reaching behind middle coxæ. Head

slender, almost as long as pronotum, antenniferous spines stout, rather short, moderately divergent; impressions of vertex, large, oval, deep. Pronotum as in fig. 26, the side margins broadly flattened, strongly reflexed, their edges coarsely crenately toothed; disk of front lobe strongly convex, of hind one flattened; discal carinæ six, the outer one each side short, the others percurrent, the median pair ending in front in short tubercles; hind margin trisinate. Scutellum subpentagonal, its apex obtuse. Elytra with basal expansions reaching apex of scutellum, strongly reflexed; behind them feebly but visibly narrowed to the rounded tips; clavus and corium with low transverse ridges. Genitals of both sexes as in fig. 26, *a* and *b*. Length, 8.5—11.5 mm. (Pl. II, fig. 26).

North Bend, Brit. Col., July 6 (*Cornell Univ. Coll.*). Parshley (1924) has recorded it from Albany, N. Y. A large and rare species of northern distribution, ranging from New England to the Pacific, but not recorded south of latitude 41°. Easily known by its large size and long, slender, parti-colored antennæ. H. G. Hubbard (1892, 252) has written of it as found on the fungus *Cryptoporus volvatius* Peck., as follows:

"This extremely thin and flattened hemipteron, swarms in and about the fungus, and evidently finds the cavity a favourable place of deposit for its eggs. A multitude of its young heaved and tumbled the dust within nearly every fungus. All ages were represented there, but the adult bugs seemed to prefer the heat and warmth of the sun, and are found on the bark of conifers infested with fungus. Their bodies, especially when immature, are particularly well adapted to transport the spores of a fungus. Everything in the nature of dust clings to them, and I have no doubt they constitute one of the most reliable propagators of the plant."

225 (370). ARADUS CINCTICORNIS Bergroth, 1906, 198.

Rather broadly oval. Blackish-brown, basal third and expanded sides of pronotum dull yellow; apical half of scutellum in part or wholly pale brown, tip black; corium, connexivum and ventrals mottled with yellowish; membrane grayish, vaguely spotted with fuscous; legs dark brown dotted with yellow, trochanters and tips of tibiæ pale. Antennæ slender, almost filiform (fig. 27*c*), joint 1 dark brown, reaching middle of tylus; 2 dotted with yellow, longer than 3 and 4 united; 3 whitish-yellow, basal third dark brown, shorter than 4. Beak reaching middle of mesosternum. Head slightly longer than pronotum; tylus short, sides parallel; impressions of vertex deep, widely separated; antenniferous spines acute, conical, with distinct lateral tooth. Pronotum with side margins broadly flattened, feebly reflexed, remotely bluntly toothed; disk with a transverse elevation across apical third on which the inner lateral carinæ end in a tubercle, median carinæ well elevated, percurrent; outer lateral carinæ short, not reaching middle of disk. Scutellum slightly longer than pronotum, sides feebly elevated, sinuate at middle.

Elytra rather strongly narrowed at middle; connexivum broadly exposed, the apical angles of the segments prominent. Genital segments as in fig. 27, *a* and *b*. Length, 5.8—6.5 mm. (Pl. II, fig. 27).

Described from Alabama and known only from there.

226 (392). *ARADUS PROBOSCIDÆUS* Walker, 1873, 35.

Elongate-oval. Pale to dark reddish-brown; antennæ, except fourth joint, hind angles of pronotum, basal expansion of corium, apical angles (sometimes the entire hind margin) of each connexival, inner halves of genital lobes, and tips of femora and tibiæ, usually pale dull yellow;

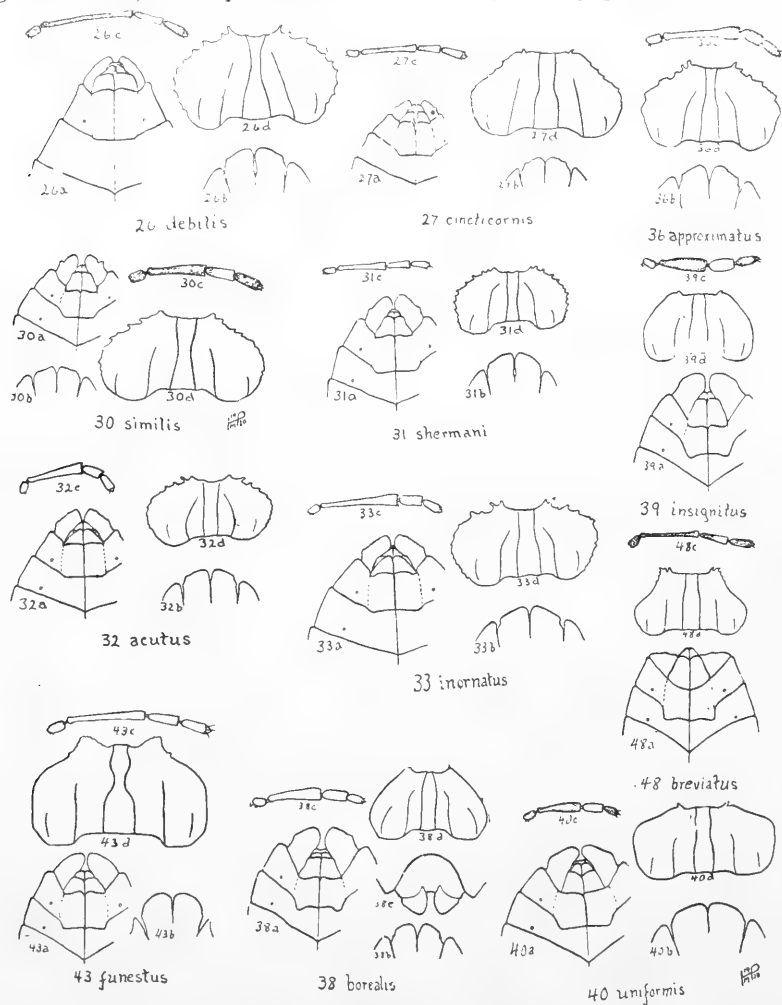


Plate II. STRUCTURES OF *ARADUS*.

a, Ventrals V and VI and genitals of female; *b*, genitals of male, terminal portion only; *c*, antenna; *d*, pronotum and sometimes the adjacent parts; *e*, dorsal view of hind part of abdomen, female; *f*, *g*, *h*, genital lobes. (After Parshley).

ventral surface of abdomen reddish-brown vaguely mottled with yellow. Head much longer than wide; tylus stout, cylindrical, feebly tapering, reaching middle third of second antennal; antenniferous spines slender, acute, strongly divergent; impressions of vertex wide, rather shallow; antennæ slender, cylindrical, almost as long as head and pronotum united, second joint two and a half times longer than third, the latter nearly twice the length of fourth. Pronotum with sides flattened, moderately reflexed, margins straight from apex to middle, thence rounded to base, edge regularly dentate, more coarsely behind; disk with two median carinæ parallel, entire, the others oblique, interrupted, all higher in front. Scutellum elongate-triangular, apex subacute, sides moderately elevated. Basal expansion of corium, rather long, broadly rounded. Male with fifth ventral slightly shorter than sixth, genital short, strongly convex, lobes short, elytra reaching their base; female dorsal genital two-thirds as long as broad, its front margin broadly curved, hind one truncate at middle, elytra reaching its base. Length, 6—9.5 mm. (Pl. I, fig. 19).

Georgetown, Colo., July 29 (*Gerhard*). A variable species of wide distribution, especially northward, its known range extending from Nova Scotia and New England west and north to Washington, British Columbia and Alaska. It is not known from the southern Ohio Valley states but occurs in Colorado, Arizona and California. The type was from Hudson's Bay and its known synonyms, according to Parshley, are *luteolus* Fyles (1903, 75); *hubbardi* Heid. (1904, 232) and *taylori* Van D. (1920, 335).

227 (—). ARADUS BASALIS Parshley, 1921, 54.

Oval. Dark brown or grayish-brown; basal angles of pronotum, basal two-thirds of corium, tip of scutellum and a spot behind it on membrane, hind margin of each connexival segment, inner margin of genital lobes and tips of second and third antennal segments, dull yellow; legs brown, the tips of tibiæ pale. Head longer than broad; tylus cylindrical, obtuse; antenniferous spines slender, acute, feebly divergent; impressions of vertex, elongate, subparallel; antennæ slender, slightly longer than head and pronotum united, second joint two and one-half times as long as third, the latter one-half longer than fourth; beak reaching onto mesosternum. Pronotum with side margins narrowly explanate, but slightly reflexed, their edges finely toothed, hind angles broadly rounded; median carinæ low, lateral ones obsolete on apical third. Scutellum rather broadly triangular, its margins strongly elevated; disk granulate, its basal impression subobsolete. Basal expansion of corium elongate, broadly curved, its edge and that of connexivum finely crenate. Connexivum broadly exposed, much more so in female. Male with fifth and sixth ventrals subequal in length, genital segment short, strongly convex, lobes short, elytra reaching their base; female with abdomen broadly oval, hind margins of dorsal genital curved, elytra strongly narrowed, reaching base of genital segment. Length, 7—8.3 mm. (Pl. I, fig. 20).

Saranac Lake, N. Y., September (*Davis*). Known only from New England and New York, where it occurs mainly in the elevated regions.

228 (—). *ARADUS CONSORS* Parshley, 1921, 56.

Elongate-oval. Grayish-brown with vague darker markings; basal third of pronotum slightly paler; membrane pale brown; hind margins of connexivals and inner margins of genital lobes obscurely pale; ventrals reddish-brown. Antennæ pale reddish-brown, joints 2 and 3 pale at apex, 4 darker; relative length of joints as in fig. 22*c*. Structure much as in *proboscideus*. Antenniferous spines shorter, conical, slightly divergent. Pronotum (fig. 22*d*) with front portion of disk flatter, teeth of side margins smaller and broader, carinæ feebly elevated. Scutellum broader, sides nearly straight, feebly elevated, tip broadly rounded. Elytra broad, covering sides of disk of abdomen; basal expansion of corium long, feebly reflexed; apex of membrane broadly rounded. Length, 7.6 mm. (Pl. I, fig. 22).

Known only from the single female type, taken in Massachusetts and now in the Museum of Comparative Zoology at Cambridge.

229 (371). *ARADUS SIMILIS* Say, 1832, 28; I, 351.

Oval, thickly and rather finely granulate above. Grayish-brown; apical half or more of third antennal, apical angles and sometimes edges of connexival segments, inner margins of genital lobes and tips of tibiæ, usually dull yellow. Head as long as broad, distinctly longer than pronotum; tylus robust, subcylindrical, obtuse; antenniferous spines rather large, feebly divergent; impressions of vertex wide, deep, straight or nearly so; antennæ slender, nearly as long as head and pronotum united, second joint more than twice as long as third, the latter one-third longer than fourth; beak reaching mesosternum. Pronotum very irregular and rugose, the transverse impression distinct; side margins narrow, not reflexed, their edge with irregular coarse teeth; carinæ well elevated, more so in front. Scutellum wider than usual, subpentagonal, sides moderately elevated, parallel on basal third, disk with two shallow impressions at base. Elytra strongly narrowed, exposing disk of abdomen within the connexivum; basal expansion of corium narrow. Abdomen broadly oval, its sides feebly notched. Male with fifth and sixth ventrals subequal in length, genital segment short, strongly convex, carinate, elytra reaching genital lobes; female with dorsal genital twice as wide as long, its hind margin curved, truncate at middle, elytra not reaching its base. Length, 4.5–8.5 mm. (Pl. II, fig. 30).

Occurs throughout Indiana, but much more common in the southern portion; March 16—Oct. 10. Staten Island and Whiteface Mt., N. Y., April 10—July 10 (*Davis*). Hibernates beneath logs and bark, mainly in dry upland localities, and in

summer found beneath bark of oak, ash, elm and other trees, and also about the wooden fungi of birch and maple. On March 20 I once found in Marion County, a large colony beneath the bark of an ash stump. The females were infested with a mite which was attached beneath the wings, causing the latter to bulge upward. This mite was described by Banks (Canadian Entomologist, XXXIV, 1902, p. 172) as *Cheyletus clavispinus*. The known range of *similis* is a wide one, extending from Nova Scotia and New England west to Wisconsin and Kansas, and southwest to Georgia, Florida and Texas. In Florida it is represented almost exclusively by the southern race. The *A. fascicornus* Walk. (1873, 36) is a synonym.

229a (371a). ARADUS SIMILIS CENTRIGUTTATUS Bergroth, 1887, 246.

This differs from typical *similis* in being nearly uniform dark blackish-brown, in all the joints of antennæ being dark and the connexival segments with only a trace of yellow at the angles.

Very common in central and southern Florida, where it occurs in colonies of all stages during the winter and spring months, beneath bark of pine and water oak that have been felled about a year. Also taken occasionally by sweeping and beating. The membrane of the elytra, as in some other Aradids, is sometimes almost a uniform whitish hyaline in hue. Parshley states that this form occurs in the northern states, but in all my collecting I have never taken a specimen in Indiana as dark as those in Florida.

230 (375). ARADUS ACUTUS Say, 1832, 28; I, 351.

Elongate-oval. Blackish-brown; a row of subquadrate spots each side of exposed disk of abdomen, and also the apical angles of each connexival segment, whitish; basal expansion and veins of corium, and disk of genital segments in part yellowish; antennæ and beak black; legs blackish-brown, the tibiæ paler. Head longer than wide, longer than pronotum; tylus cylindrical, obtuse; antenniferous spines slender, acute, distinctly divergent; impressions of vertex narrow, deep, subparallel; antennæ with second joint clavate, nearly three times as long as third, the latter but slightly longer than fourth; beak reaching middle of mesosternum. Pronotum with side margins rounded, moderately flattened, feebly reflexed, their hind edges irregularly crenate, front ones with a few longer teeth; disk with transverse impression distinct, carinæ moderately elevated, not reaching front margin. Scutellum wide, subpentagonal, its sides subparallel to middle, thence converging to the narrowly rounded apex; margins feebly elevated. Basal expansion of corium narrow, broadly curved, its edge crenate. Connexivum fully exposed, as are also, in part, the sides of abdominal disk. Male with fifth

and sixth ventrals subequal in length, elytra extending to genital lobes; female with dorsal genital segment about one-half as long as broad, its hind margin truncate at middle, elytra not quite reaching its base. Length, 7—9.5 mm. (Pl. II, fig. 32).

Southern half of Indiana, frequent, Feb. 11—Oct. 1; Lake County only in the north. Dunedin and St. Petersburg, Fla., Dec. 3—March 15 (*W. S. B.*). Southern Pines, N. Car., April (*Davis*). In Indiana it hibernates beneath half buried logs and in summer occurs beneath bark and on a whitish semi-woody fungus on stumps. In Florida it has been found only beneath the bark of dead water oak, *Quercus nigra* L., where it is common during the winter in small colonies in company with *Neuroctenus simplex* (Uhl.). The known range of *A. acutus* covers most of the United States, extending west from New England to the Pacific and south and southwest to Florida and Texas, but it has not as yet been recorded from Canada. It is readily recognized by its long black clavate second joint of antennæ and the pale markings of abdomen and elytra. These are formed mostly of whitish granules and vary much in size and extent, sometimes covering most of the connexival segments.

231 (377). *ARADUS SHERMANI* Heidemann, 1907, 68.

Elongate-oval. Black; membrane fuscous, a small pale spot near apex of scutellum; apical angles of connexivals usually dull yellow. Head longer than wide; tylus long, stout, cylindrical; antenniferous spines slender, acute; impressions of vertex large, deep, subparallel; antennæ slender, as long as head and pronotum united, second joint slightly longer than third and fourth together; beak reaching onto mesosternum. Pronotum with side margins flattened, feebly reflexed, their edges with numerous teeth of irregular length; disk with four nearly entire moderately elevated carinæ. Scutellum elongate-triangular, sides feebly elevated; disk with a low rounded elevation at middle, two impressions on base. Abdomen oval, its edges notched. Male with sixth ventral one-third longer than fifth, genital segment short, strongly convex, carinate, elytra covering the connexivum in part, reaching middle of genital lobes; female with dorsal genital one-half longer than broad, elytra reaching middle of sixth dorsal. Length, 6.8—8.8 mm. (Pl. II, fig. 31).

Southern Pines and Aberdeen, N. Car., April 9—May (*Brimley*). Ranges from Quebec, Ontario and New England, southwest to Georgia.

232 (378). *ARADUS INORNATUS* Uhler, 1876, 323.

Elongate-oval. Fuscous or dark brown; basal expansion of corium and connexivum paler, the latter sometimes spotted with dull yellow;

apical half of antennæ black; both dorsal and ventral surface of abdomen reddish. Head much longer than broad; tylus long, sides somewhat compressed; antenniferous spines long, acute, feebly divergent; impressions of vertex narrow, deep, parallel; antennæ slender, shorter than head and pronotum united, second joint more than three times the length of third, the latter slightly longer than fourth; beak reaching middle third of mesosternum. Pronotum with sides broadly flattened, feebly reflexed, their edges with numerous irregular teeth; disk with four nearly entire carinæ, the outer basal one each side distinct. Scutellum subpentagonal, sides feebly elevated, subparallel to middle, apex narrowly rounded. Male with sides of abdomen crenate, fifth and sixth ventrals subequal, genital segment short, strongly convex, elytra reaching genital lobes; female with dorsal genital twice as wide as long, its hind margin obtusely angulate, elytra scarcely reaching its base. Length, 8.5—10 mm. (Pl. II, fig. 33.)

Raleigh, N. Car., Feb. 17 (*Brimley*). Ranges from Quebec and New England west to Wisconsin and South Dakota, and southwest to Georgia, the Pacific Coast examples included by Uhler having since been described as *blaisdelli* Van D. Not as yet recognized but should occur in Indiana. Resembles *acutus* in form and size, but differs in lacking the yellow spots on connexivals and in its longer, more slender second antennal.

233 (—). ARADUS APPROXIMATUS Parshley, 1921, 72.

Elongate-oval. Grayish-brown sprinkled with whitish granules and tinged with dull yellow along the margins; membrane brownish with scattered darker spots; disk of abdomen above bright red; antennæ dark beyond apical third of second segment. Head longer than broad; tylus elongate, subcylindrical, compressed; antenniferous spines slender, acute, divergent; postocular tubercles prominent, acute; impressions of vertex oval, deep; second antennal suddenly enlarged near apex, more than three times as long as third, the latter nearly twice as long as fourth; beak reaching apical third of mesosternum. Pronotum with margins rather broadly expanded, feebly reflexed, their edges granulated behind and with a few irregular teeth in front; disk with transverse impression distinct, carinæ feebly elevated. Scutellum broadly subpentagonal, sides scarcely elevated, apex narrowly rounded. Basal expansion of corium long, narrow, flat. Connexivum widely exposed, its edges feebly notched. Male with fifth ventral slightly longer than sixth, genital segment strongly convex, its lobes long, elytra reaching their base; female, dorsal genital segment twice as wide as long, elytra reaching its base. Length, 8—11 mm. (Pl. II, Fig. 36).

Lake Co., Ind., Oct. 23 (*W.S.B.*). Thomasville, Ga., March 12 (*Davis*). Three specimens of this large and recently described species were taken from beneath the bark of pine snags near Millers in 1902. Its known range extends from

Mount Katahdin, Me., to Agricultural College, Miss., but only about half a dozen specimens are recorded. The long, suddenly enlarged second antennal, and red abdominal disk separate it from *inornatus*, its nearest ally.

GROUP V.—ARADUS.

Species of small size and dark color having the margins of pronotum entire or granulated, often sinuate. Basal expansion of corium usually narrow or obsolete. Twelve of our eastern species belong to this group.

KEY TO EASTERN SPECIES OF GROUP V, ARADUS.

- a. Corium strongly dilated at base, width of elytra at that point usually greater than that of pronotum.
- b. Third antennal segment pale; length less than 6 mm.

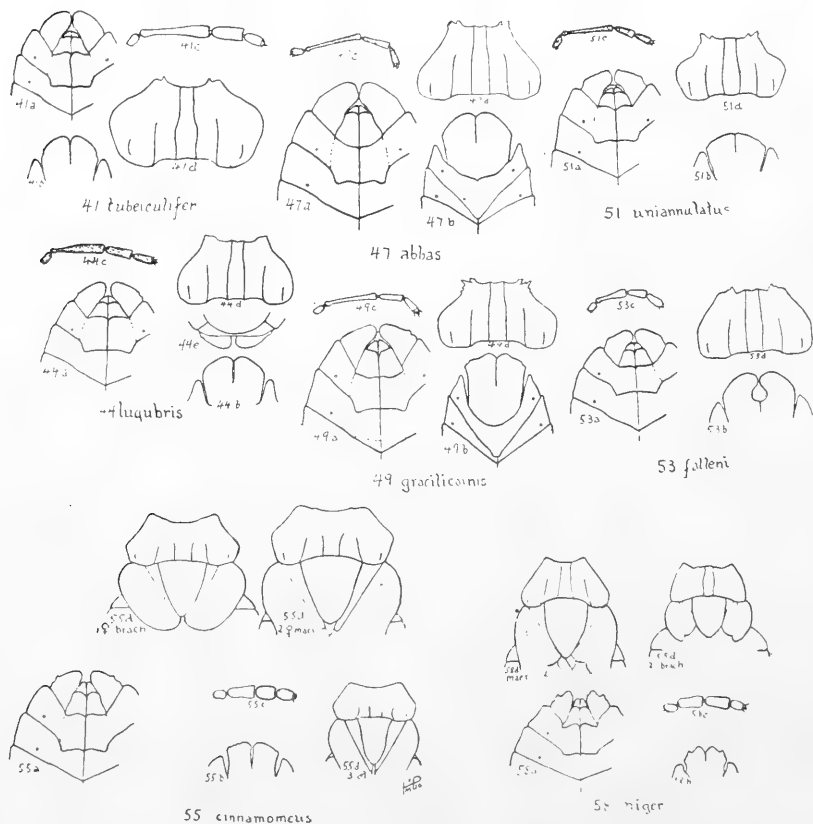


Plate III. STRUCTURES OF ARADUS.

a, Ventrals V and VI and genitals of female; b, genitals of male, terminal portion only; c, antenna; d, pronotum and sometimes the adjacent parts; e, dorsal view of hind part of abdomen, female; g, l. genital lobes. (After Parshley).

- c.* Pronotum widest before middle; second antennal distinctly more slender than front femora. 234. UNIFORMIS.
- cc.* Pronotum widest behind middle; second antennal slightly thicker than front femora. 235. INSIGNITUS.
- bb.* Third antennal segment dark; second segment distinctly clavate, shorter than head; length, 6.2 or more mm.
- d.* Pronotum widest well behind middle (fig. 38*d*). 236. BOREALIS.
- dd.* Pronotum widest near middle (fig. 41*d*); sides of scutellum strongly elevated; color black. 237. TUBERCULIFER.
- aa.* Corium slightly or not at all dilated at base, width of elytra at that point about equal to that of pronotum.
- e.* Scutellum broad, distinctly pentagonal, its sides strongly and sharply elevated; sides of pronotum subparallel behind the middle; length about 6 mm. 238. FUNESTUS.
- ee.* Scutellum narrower, elongate-triangular, its sides usually but slightly elevated; sides of pronotum behind middle rarely subparallel; length less than 6 mm.
- f.* Third antennal segment not more than one-half the length of second (figs. 44*c*—51*c*).
- g.* Antennæ moderately robust, the second segment strongly narrowed in basal third (fig. 44*c*); scutellum at middle narrower than corium at same level.
- h.* Membrane maculate with brownish; sides of scutellum strongly elevated; third antennal in part white or wholly black; connexivum narrowly or not at all exposed. 239. LUGUBRIS.
- hh.* Membrane white, immaculate; sides of scutellum feebly elevated; third antennal brown; connexivum broadly exposed. 240. BRUNNICORNIS.
- gg.* Antennæ slender, second segment slightly and gradually enlarged from near base (fig. 49*c*), sometimes abruptly thickened near apex.
- i.* Pronotum widest well behind the middle, its posterior side margins rounded or nearly parallel (figs. 47*d*—49*d*).
- j.* Antennæ biannulate with white; corium not hyaline.
- k.* Elytra of both sexes not exceeding the tip of abdomen; genital lobes of female extending beyond second genital segment (fig. 47*a*). 241. ABBAS.
- kk.* Elytra of female (male not known) extending well beyond apex of abdomen; genital lobes of female truncate, not extending beyond tip of second genital segment (fig. 48*a*). 242. BREVIATUS.
- jj.* Antennæ not biannulate; corium largely hyaline, without distinct transverse veinlets. 243. GRACILICORNIS.
- ii.* Pronotum widest slightly behind middle, its posterior side margins straight and converging; color black; apical third of third antennal segment pale. 244. UNIANNULATUS.
- ff.* Third antennal segment about two-thirds as long as second; antennæ pale brown. 245. FALLENI.

234 (384). ARADUS UNIFORMIS Heidemann, 1904, 231.

Broadly oval. Uniform fuscous-black; apical angles of connexival segments faintly yellowish; third joint of antennæ wholly whitish; cells of membrane with fuscous cross-bars. Head short, about as long as broad; tylus cylindrical, obtuse; antenniferous spines small, acute, slightly divergent; impressions of vertex short, rather shallow; antennæ short, stout, second joint clavate, more than twice as long as third, the latter one-third longer than fourth; beak reaching hind margin of front coxæ. Pronotum with side margins flattened, rounded, feebly reflexed, their edges minutely and evenly granulated; disk with six carinæ distinct, only the middle pair entire. Scutellum elongate-triangular, sides strongly elevated, sinuate at middle. Basal expansion of corium long, rather wide, its edge minutely crenate. Connexivum narrowly exposed, male, almost wholly exposed, female. Male with abdomen oblong-oval, fifth ventral much shorter than sixth, genital segment short, moderately convex, lobes large, elytra reaching their tips; female with abdomen broadly and evenly oval, dorsal genital segment with hind margin truncate, elytra reaching its apex. Length, 4.7–5.5 mm. (Pl. II, fig. 40).

Dunedin, Fla., Feb. 23; beaten from Spanish moss; the first record for that State (*W.S.B.*). Rockaway Beach, Long Island, N. Y., May 26; Lakehurst, N. J., May 29 (*Davis*). Aberdeen and Southern Pines, N. Car., April 23 (*Brimley*). Ranges from Massachusetts to Pennsylvania and south to North Carolina and Florida. Occurs especially along the ocean in beach drift. A handsome and well marked little species, easily recognized by its broad form, dark color, and short antennæ with third joint pale.

235 (—). ARADUS INSIGNITUS Parshley, 1921, 75.

"Black, third antennal bright orange-yellow. Similar in structure to *uniformis* except as follows: Tylus long, strongly compressed, slightly enlarged at middle; antenniferous spines short, stout; antennæ (fig. 39c) as thick as front femora, first segment scarcely reaching middle of tylus, length of second almost equal to width of head including one eye (17 to 19). Pronotum (fig. 39d) distinctly convex, the lateral margins slightly expanded, strongly reflexed, carinæ well elevated. Scutellum obscured. Hemelytra obscured, apparently reaching almost to apex of abdomen; basal expansion of exocorium slight. Abdomen broadly oval, the lateral margins almost entire. Length, 5 mm." (*Parshley*). (Pl. II, fig. 39).

The above is the original description of the single damaged female type, taken in Massachusetts and now in the Parshley collection. Of it he says: "The antennal, pronotal and genital characteristics are so distinctive that there can be no possibility of confusing it with *uniformis*, its nearest ally."

236 (376). *ARADUS BOREALIS* Heidemann, 1909a, 190.

Elongate-oval. Dull fuscous-brown; head, pronotum, scutellum and connexivals thickly beset with small grayish granules; tip of scutellum and apical angle of each connexival, reddish-yellow; beak and legs brownish-yellow; ventrals reddish-brown with two rows of small round black spots each side. Head slightly longer than wide, tylus stout, strongly compressed; antenniferous tubercles with spines short, conical, acute. Antennæ stout, joint 1 and basal half of 2 pale brown, remainder blackish; 1 very short, reaching only to middle of tylus; 2 gradually, evenly clavate, slightly shorter, than width of head across eyes; 3 two-fifths the length of 2, twice as long as four, the latter fusiform. Beak reaching onto mesosternum. Pronotum nearly twice as wide as long, side margins reflexed, finely crenulate, basal margin broadly concave; disk with six carinæ, the two inner ones entire, the outer one each side shorter and curved inward. Scutellum nearly twice as long as wide at base, its margins thickened and reflexed. Elytra with reflexed basal expansion of corium long and rather narrow. Abdomen ovate, widest behind the middle. Genital segments as in fig. 38. Length, 6.5—7.8 mm.

Maine (*U. S. Nat. Mus.*). A scarce species of northern distribution, its range extending from Quebec and Maine to Saskatchewan and California.

237 (382). *ARADUS TUBERCULIFER* Kirby, 1837, 278.

Oblong-oval. Dark reddish to blackish-brown; head, pronotum, scutellum and apical portion of antennæ often darker; hind margin of each connexival segment narrowly yellow. Head as wide as long; tylus compressed, feebly tapering; antenniferous spines stout, acute, divergent; impressions of vertex oval, rather shallow; antennæ as long as head and pronotum, first joint very short, second suddenly clavate at apical third, about two and a fourth times the length of third, the latter one-half longer than fourth; beak reaching onto mesosternum. Pronotum with margins slightly flattened, feebly reflexed, sinuate in front, rounded behind, their edges finely granulate; disk with carinæ distinct, the median pair only entire. Scutellum elongate-triangular, sides strongly elevated, sinuate near middle, apex acute. Basal expansion of corium narrow, elongate. Male with fifth ventral shorter than sixth, genital segment large, strongly convex, abdomen narrow, oblong-oval, covered by elytra, which extend beyond its apex; female with abdomen broadly oval, connexivum broadly exposed, elytra reaching apex of dorsal genital, the latter with suture between it and lobes obsolete. Length, 6.5—7.3 mm. (Pl. III, fig. 41).

Rockaway Beach, L. I., June 26 (*Davis*). Kirby's type was from Canada, lat. 65°, and its known range is northern, extending from Quebec and Maine west and northwest to Minnesota, Colorado, California, Alberta and Alaska. It was redescribed by Bergroth (1913, 3). The *A. caliginosus* Walker (1873, 36) is a synonym.

238 (383). ARADUS FUNESTUS Bergroth, 1913, 4.

Elongate-oblong. Head, pronotum and scutellum dark brown to black; elytra grayish- or fuscous-brown; connexivals fuscous, their hind margins broadly pale; membrane dark fuscous, the veins in part paler; antennæ, legs and beak dark fuscous- to reddish-brown; ventrals reddish-brown; sterna and genital plate blackish. Head longer than wide, tylus rather broad, its sides parallel; vertex with two deep oblong impressions; antenniferous spines stout, subacute, parallel. Antennæ subequal in length to length of head and pronotum united, joint 1 very short, 2 slender, as long as width of head across eyes, 3 and 4 slightly stouter, 4 two-thirds the length of 3. Pronotum as in fig. 43*d*, sides of basal half of disk convex, side margins narrowly reflexed. Scutellum as in key, longer than middle of pronotum, its apex acute. Elytra, male, reaching or slightly passing tip of abdomen, female reaching apex of dorsal genital segment. Connexivum, male narrowly or not at all exposed; female, broadly so. Male with fifth ventral about two-thirds as long as sixth; genital very large, its basal half strongly convex. Length, 5.7—6.3 mm. Female with hind margin of dorsal genital feebly and broadly curved. Length, 7—8 mm. (Pl. II, fig. 43).

Moscow, Idaho (*Osborn*). Ellensburg, Wash. (*U. S. Nat. Mus.*). A species of northern distribution, ranging from Quebec and Ontario west to Alaska and the Pacific States. Known also from Arizona and Nevada. Formerly recorded as *A. tuberculifera* Kirby.

239 (386). ARADUS LUGUBRIS Fallen, 1807, 34.

Oblong-oval. Fuscous-brown to black; apical third or more of third antennal and apical angles or hind margins of connexivals dull white; membrane whitish-hyaline maculate with brown; ventral surface dull brown, the incisures of connexivals pale. Head as long as broad; tylus stout, cylindrical; impressions of vertex broad, shallow, united behind; antennæ rather stout, shorter than head and pronotum together, second joint two and a half times longer than third, the latter one-half longer than fourth; beak reaching middle of mesosternum. Pronotum strongly narrowed in front, sides not flattened, moderately reflexed, feebly sinuate behind front angles, their edges evenly granulate; disk with all six carinæ distinct, only the middle pair entire. Scutellum elongate-triangular, sides strongly elevated, feebly sinuate near middle, apex acute, disk with rounded median elevation. Corium long, reaching base of fifth segment, without basal expansion. Male with fifth ventral slightly longer than sixth, genital segment large, moderately convex, elytra as broad as abdomen, reaching its tip in both sexes; female with genital lobes rather long, their hind margin rounded, abdomen narrowly oval, wider than elytra, its margins entire. Length, 4.8—6.4 mm. (Pl. III, fig. 44).

Georgetown, Colo., July 27; Ormsby Co., Nev., July (*Gerhard*). A species of wide distribution in the northern parts of

both Continents, its known range in America extending from Labrador, Quebec and New England west and north to Illinois, Montana, Washington and Alaska. It is not recognized by Parshley as occurring west of the Alleghenies from the region south of Michigan and northern Illinois, but occurs in Nebraska, New Mexico and California. However, Say's *A. rectus* (I, 352) which Bergroth (1892, 336) places as a synonym of *lugubris*, was described from "Missouri and Florida." Parshley makes no mention whatever of Say's species. Other synonyms of *lugubris* are *affinis* Kirby (1837, 279) and *fenestralis* Walker (1873, 36). A form with antennæ wholly black is known as *var. nigricornis* Reut. Of the habits of *lugubris* about Colden, Ont., in July Van Duzee (1894, 182) states:

"Several individuals appeared on the trunk of a small maple tree about five o'clock every afternoon. They were very active, leaping and sporting about in the rays of the declining sun, as flies of the Tachinidæ frequently do. The reflection of the sunlight from their white glassy wings made these little black bugs look like drops of silver as they darted from point to point, and their activity made it next to impossible to capture them or even to trace them with the eye."

240 (—). *ARADUS BRUNNICORNIS* sp. nov.

Elongate-oblong, sides subparallel. Black; antennæ, veins of elytra, tibiæ, tarsi and ventrals in great part, dark reddish-brown; membrane wholly white; apical fourth or less of connexivals above and beneath dull yellow. Head slightly longer than broad; eyes prominent, protruding beyond apical angles of pronotum; tylus stout, subcylindrical, apex obtuse; impressions of vertex deep, elongate, subparallel; antenniferous spines stout, conical, moderately divergent. Joint 1 of antennæ not reaching middle of tylus, 2 subclavate, as long as width of vertex plus one eye, 3 and 4 subequal in length, as stout as apex of 2, united equal in length to 2. Pronotum trapezoidal, widest at basal third, side margins moderately reflexed, finely granulate; hind one broadly concave in front of scutellum; four inner carinæ of equal length, subparallel, terminating in front on an obtuse transverse preapical ridge, the usual outer carinæ subobsolete; disk evenly granulated, finely transversely strigose between the carinæ. Scutellum longer than pronotum, sides feebly elevated, evenly converging almost from the base to the subacute apex. Elytra reaching middle of last dorsal, basal expansion of corium scarcely evident; cross-veins of corium very few, cells largely hyaline. Connexivum broadly exposed. Abdomen broader than elytra in both sexes. Length, 4—4.5 mm.

Dunedin, Fla., April 4; one specimen taken at light (*W. S. B.*). Raleigh and Dunn, N. Car., April—July (*Brimley*). Allied

to *lugubris*. Differs in its smaller size and by characters given in key.

241 (387). *ARADUS ABBAS* Bergroth, 1889, clxxx.

Elongate-oblong. Head, pronotum and scutellum black or dark brown; elytra and under surface grayish or fuscous-brown; membrane hyaline, mottled with quadrate fuscous spots; antennæ fuscous, the tip of second segment and apical half of third white, fourth black. Head as long as broad; tylus short, stout, cylindrical; antenniferous spines slender, acute, feebly divergent; antennæ very slender, as long as head and pronotum united, second joint more than twice the length of third, the latter one-half longer than fourth; beak reaching middle third of mesosternum. Pronotum much narrowed from middle to apex, side margins not flattened, slightly reflexed, feebly sinuate, finely and irregularly granulate, hind angles rounded; disk with four nearly entire moderately elevated carinæ, the basal one each side evident. Scutellum narrow, elongate-triangular, apex subacute, sides rather strongly elevated; disk with median elevation and fine transverse rugæ. Elytra in both sexes reaching apex of abdomen. Male with fifth ventral much shorter at middle than sixth, genital segment large, strongly convex; hind margin of dorsal genital of female with small notch at middle. Length, 4.6—5.5 mm. (Pl. III, fig. 47).

Lake Waccamaw and Terra Ceia, N. Car., April 16—September (*Brimley*). Iditarod, Alaska, July 27 (*Gerhard*). A small, well marked species of wide distribution, its known range extending from Newfoundland, Quebec and New England west and northwest to Washington, British Columbia, and Alaska and south and southwest to Florida and California. Known from both Michigan and Illinois but not as yet from Indiana. The only Florida station recorded is Atlantic Beach by Mrs. A. T. Slosson. Superficially this species resembles *lugubris* very closely. It is best distinguished by the more slender antennæ, the second joint of which is much less clavate, being only slightly enlarged near apex.

242 (388). *ARADUS BREVIATUS* Bergroth, 1887, 245.

Female—"Color and structure as in *abbas*; posterior lateral margins of pronotum distinctly oblique; elytra extending well beyond apex of abdomen. Dorsal genital segment apparently much abbreviated; second dorsal genital visible from above (through the wings); ventral genital segments as in *abbas* except that the genital lobes are truncate, scarcely extending beyond apex of first genital segment. Length, 5 mm." (*Parshley*). (Pl. II, fig. 48).

Known from a single Florida female in Bergroth's collection. Of it Parshley (1921, 86), who examined the type, says: "It

presents no characteristics wholly foreign to *abbas* except in the structure of the genital lobes and the dorsal genital segment." Later (Ms.) he says: "*Breviatus* is undoubtedly an abnormal female, and I never expect to see another."

243 (390). ARADUS GRACILICORNIS Stal, 1873, 136.

Elongate-oval. Black or dark brown; head with an oblique pale line behind each eye; corium with base and veins dark brown, its cells whitish-hyaline, clavus, except base, and membrane, hyaline; apical angles of connexival segments yellowish, conspicuously so in female. Head as long as broad, tylus stout, subcylindrical; antenniferous spines small, slender, acute, divergent; impressions of vertex narrow, deep, widely separated; antennæ very slender, as long as head and pronotum united, second joint two and a half times as long as third, fourth slightly shorter than third, enlarged near apex; beak reaching middle of mesosternum. Pronotum with side margins narrow, scarcely reflexed, obtusely rounded behind the middle, their edges finely granulated and with two or three irregular teeth near front angles; disk with four carinæ well elevated, nearly entire. Scutellum longer than pronotum, subtriangular, sides parallel on basal third, apex narrowly rounded. Outer basal edge of corium nearly straight. Male with fifth ventral deeply emarginate, very short at middle, genital segment very long, moderately convex; abdomen narrowly oval, almost covered by elytra, which reach its tip. Female with dorsal genital broad, its hind margin notched at middle, connexivum fully exposed, elytra reaching middle of dorsal genital. Length, 4.7—5.8 mm. (Pl. III, fig. 49).

Dunedin, Fla., Feb. 13—March 28. Taken from beneath the bark of oak and by sweeping along the margin of a pond. Wallace, N. Car., April 4 (*Brimley*). Described from Cuba and known from Georgia, Mississippi, Texas, Arizona and New Mexico. In Florida it has hitherto been recorded from several stations along the east coast. The slender antennæ, hyaline elytra and long genital of male are the principal distinguishing characters.

244 (—). ARADUS UNIANNULATUS Parshley, 1921, 90.

Elongate-oval. Black, base of head with oblique black lines; membrane hyaline and with faint brownish spots; hind margins of connexivals narrowly pale. Head about as long as broad, as long as pronotum; impressions of vertex broad, shallow, widely separated, connected behind; antenniferous spines short, feebly divergent. Antennæ slender (fig. 51c), nearly as long as head and pronotum united, joint 1 reaching beyond middle of tylus, 2 equal to width of head including one eye; beak reaching middle of mesosternum. Scutellum slightly longer than pronotum, sides feebly elevated, straight to apical third, thence slightly curved to the subacute apex, base depressed except at angles. Elytra,

male, broad, covering connexivum, reaching tip of abdomen; of female narrowed toward apex, leaving connexivum narrowly exposed, reaching genital lobe. Male and female genitals as in fig. 51. Length, 4.2—4.5 mm. (Pl. III, fig. 51).

Ranges from Long Island, N. Y. (*Davis*), west to Michigan and Alberta and south to Washington, D. C.

245 (389). *ARADUS FALLENI* Stal, 1860, 68.

Elongate-oval. Black; membrane and cells of corium whitish-hyaline; hind margin of connexivals and inner margin of genital lobes yellowish; antennæ, beak and legs brown. Head slightly broader across the eyes than long; tylus short, sides parallel; antenniferous spines short, stout, divergent; impressions of vertex short, broad, shallow, united behind; antennæ rather stout, distinctly shorter than head and pronotum together, second joint gradually clavate from the base, one-half longer than third, which is subequal to fourth; beak reaching mesosternum. Pronotum with side margins narrowly reflexed, subsinuate in front of middle, their edges granulate; disk with four carinæ well elevated, nearly entire. Scutellum elongate-triangular, sides strongly elevated, apex subacute. Outer margin of base of corium nearly straight. Male with fifth ventral distinctly shorter than sixth; genital segment very short, moderately convex, with a small rounded impression near apex; elytra covering most of abdomen, reaching genital lobes; female, dorsal genital segment truncate behind, connexivum widely exposed. Length, 3.7—5 mm. (Pl. III, fig. 53).

Dunedin, Miami and Royal Palm Park, Fla., March 21—April 9. At Dunedin two specimens were taken in my house at light; at the Park one was taken at light, a second by sifting weed debris in low damp ground, and a third beneath a "bootjack" of cabbage palmetto. Described from Brazil and ranges through most of both North and South America. Taken in both Ohio and Illinois, but not as yet known from Indiana. Recorded by Barber from seven localities in southern Florida, April—December. The second joint of antennæ is subequal in length to three and four together and not distinctly shorter as stated by Van Duzee (1909, 175). It has been recorded several times as occurring at light and is also said to be found on pine.

GROUP VI.—ARADUS.

This group comprises a single very small reddish-brown species.

246 (391). *ARADUS CINNAMOMEUS* Panzer, 1794, Heft 100, 20.

Broadly oval. Reddish-brown, eyes and joints 3 and 4 of antennæ darker; membrane (macropterous form) whitish-hyaline. Head slightly

broader than long, distinctly longer than pronotum; tylus thick, subdepressed, apex rounded; antenniferous spines stout, strongly divergent; impressions of vertex, shallow, ill defined; antennæ short, stout, but slightly longer than head, second joint one-half longer than third, the latter subequal to fourth; beak reaching mesosternum. Pronotum feebly convex, side margins moderately flattened, not reflexed, their edges very finely dentate; carinæ evident but faint, confined to basal half. Scutellum triangular, sides scarcely elevated, apex subacute. Abdomen broadly oval, its margins almost entire. Male macropterous, elytra strongly narrowed at middle, enlarged at apex, reaching base of genital lobes, fifth ventral half the length of sixth, genital segment large, strongly convex. Female dimorphic, in macropterous form, the elytra broad, covering most of disk of abdomen and reaching base of dorsal genital, in brachypterous form but slightly longer than scutellum, membrane absent, costal margin broadly rounded. Length. 3—5 mm. (Fig. 65; Pl. III, fig. 55).



Fig. 65, X 7.
(After Lugger).

Dunedin, Fla., Dec. 17—Jan. 31 (*W. S. B.*). Wilmington and Long Island, N. Y.; Lakehurst, N. J.; Southport, N. Car.; Rabun Co., Ga., April—July (*Davis*). Ranges from Massachusetts west to Nebraska and southwest to Florida, Texas and California. Also occurs generally in the Palæarctic Region. The Dunedin record is the first one for Florida, two brachypterous females having been beaten from pine on the dates mentioned. Parshley (1921, 96) states that it is usually taken by beating pine branches rather than by searching under sheets of dead bark. He quotes Kiritschenko⁴⁸ who says that: "In the district of Lomja the damage done by *A. cinnamomeus* is appreciable, consisting in the drying up of the tree-tops of pines which are overrun by quantities of these insects which keep mostly under the loose pieces of bark on the upper part of the stem."

GROUP VII.—ARADUS.

To this group belong the species of the subgenus *Quilms* Stal (1873, 137). They are of medium or small size and dark color and have the beak short, not passing base of head, pronotum small, without expanded margins. Our single eastern species is less than 7 mm. in length, the antennæ very stout, shorter than head and pronotum together. It is dimorphic in wing length.

⁴⁸Faune Russie Hemipt., VI, 1913, 89.

247 (395). *ARADUS NIGER* Stal, 1873, 137.

Broadly oval. Black; basal expansion of corium (in macropterous form) and apical angles of connexivals obscurely pale. Head as broad as long; tylus short, extending slightly beyond first antennal, its sides compressed; impressions of vertex oval, shallow; antennæ thick, basal joint very broad, second slightly longer than third which is twice the length of fourth; beak reaching hind border of eyes. Pronotum very short, in brachypterous form half as long as head, side margins straight, slightly reflexed, their edges granulate, carinæ evident but feebly developed. Scutellum triangular, its sides feebly elevated, disk concave. Elytra in macropterous form evenly narrowed from the basal expansion, exposing the connexivum, reaching genital segment, veins of membrane reticulate; in brachypterous form but slightly longer than scutellum, membrane absent. Male, fifth ventral slightly shorter than sixth, genital segment short, strongly convex; female, hind margin of dorsal genital sinuate, concavely curved at middle. Length, 5—6.5 mm. (Pl. III, fig. 58).

Lakehurst, N. J., April 25; Nova Scotia, June (*Davis*). Southern Pines, N. Car., January (*Brimley*). Ranges from Nova Scotia and New England southwest to South Carolina; known also from Colorado, Texas and Mexico. Stal's types were from South Carolina, but the insect remained unknown to American collectors until Heidemann (1901, 389) discovered it in some numbers in the rubbish and decaying matter under the loose bark of pine trees near Washington, D. C. He observed the winged male mating with the unwinged female and also both sexes in the unwinged state.

Subfamily II. MEZIRINÆ.

Flat-bugs of medium or small size, having the head short, depressed, usually wider behind the eyes than in front of them; tylus short, rarely exceeding apex of first joint of antennæ; beak very short, enclosed in a groove on under surface of head; prosternum and abdomen without a groove or sulcus; pronotum trapezoidal or subquadrate, its side margins not explanate or reflexed, disk rarely with carinæ; scutellum short, broad, its margins but slightly elevated; elytra without basal expansion of corium, confined within the boundaries of the disk of abdomen; connexivum very broad, fully exposed; under surface flat; all the coxæ moderately separated; trochanters free from the femora; abdominal spiracles placed at equal distances from the front and hind margins of the segments. The subfamily is mainly tropical or subtropical in distribution and comprises eight North American genera, seven of which are represented in our territory.

KEY TO EASTERN GENERA OF MEZIRINÆ.

- a.* Antennæ very short, the two basal joints united not reaching apex of tylus; scutellum very long and narrow, extending beyond the middle of abdomen; elytra membranaceous, the corium linear; length, less than 4 mm. I. CALISIUS, p. 317.
- aa.* Antennæ longer, the second joint always extending beyond apex of tylus; scutellum of medium size, triangular or with apex rounded; elytra in part coriaceous, the corium usually distinct from membrane.
- b.* Scutellum triangular, never wider than long; fourth joint of antennæ but little if any longer than third, often much shorter.
- c.* Venter more or less convex, its third, fourth and fifth segments without a carina or keel between the spiracles and side margin.
- d.* Pronotum with side margins near middle bi-marginate or bisinuate, its surface not granulate or rugose, but with callosities formed of a pale crust; color pale brown or grayish; rostral groove lanceolate. II. PROXIUS, p. 318.
- dd.* Pronotum with side margins straight or unisinuate near middle; surface granulate or rugose; color black or dark reddish brown, rarely paler; rostral groove linear.
- e.* Membrane without distinct veins; third joint of antennæ (in our species) longer than second. III. PICTINUS, p. 320.
- ee.* Membrane with distinct veins.
- f.* Length, less than 4 mm.; base of thorax trisinuate in front of scutellum; spiracles placed near the side margins of ventrals. IV. NANNIUM, p. 320.
- ff.* Length, 5 or more mm.; base of thorax truncate in front of scutellum; spiracles equally distant from front, side and hind margins of ventrals; third joint of antennæ distinctly longer than second. V. MEZIRA, p. 321.
- cc.* Venter very flat, its third, fourth and fifth segments with a carina or keel between the spiracles and side margins; third joint of antennæ but little longer than second. VI. NEUROCTENUS, p. 324.
- bb.* Scutellum as wide or wider at base than long, its apex very broadly rounded; fourth joint of antennæ much longer than third; membrane without veins. VII. ANEURUS, p. 327.

I. CALISIUS Stal, 1860, 67.

Very small pale brown or fuscous-yellow species having the antennæ shorter than head; margins of rostral sulcus parallel, distant throughout their length; sides of metanotum and first dorsal visible from above; pronotum with two to four short ridges on both front and hind lobes; osteolar opening distinct, punctiform, placed in front of hind coxæ. Two of the half-dozen known species occur in Florida.

KEY TO EASTERN SPECIES OF CALISIUS.

- a.* First joint of antennæ slightly surpassing apex of antenniferous spines; color fuscous-ochraceous, sometimes darker. 248. CONTUBERNALIS.

aa. First joint of antennæ scarcely reaching apex of antenniferous spines; color pale dull yellow. 249. ANÆMUS.

248 (397). CALISIUS CONTUBERNALIS Bergroth, 1913, 6.

Oblong-oval. Dull grayish-yellow; base of elytra, some dots on scutellum and middle of each connexival, fuscous. Head porrect, slightly longer than broad, granulated above; antennæ stout, as long as head, joints 1 and 2 subequal, 3 and 4 each slightly longer than those preceding; beak reaching base of head. Pronotum shorter than head, narrowed in front; disk finely punctate and with four obtuse granulated carinæ, the outer two converging, entire, the others confined to basal half. Scutellum abruptly constricted and prolonged backward as a narrow ridge to beyond middle of abdomen. Elytra finely and closely granulate-punctate. Sides of abdomen strongly reflexed; connexivum, viewed from the side, formed of two layers, the edge of each division of the upper one with two short lobes, the front one brown, the hind one pale; of the lower one with three lobes, the middle one fuscous, the others pale. Length, 3.2—3.8 mm.

Dunedin, Fla., April 17; one specimen beaten from limbs of dead oak. The type, now in the U. S. National Museum, is from St. George Island, Fla. Known elsewhere only from Guadeloupe Island, W. I.

249 (398). CALISIUS ANÆMUS Bergroth, 1913, 7.

"Closely allied to the preceding but entirely very pale ochraceous without darker markings, all granules and tubercles being as pale as the ground color. First joint of antennæ very short, reaching apex of antenniferous spines (remaining joints wanting). The two convergent keels of anterior pronotal lobe connected at apex by a short transverse ridge. Scutellum without the transverse series of small tubercles close to apical margin, but the apical margin itself distinctly crenulated. Under side of body very finely and thickly granulated. First male genital a little shorter than sixth ventral, the apical margin slightly sinuate at middle. Second male genital with median lobe very narrowly triangular. Length, male, 3.8 mm." (*Bergroth*).

Known only from Biscayne Bay, Fla., where it was taken in May by E. A. Schwarz and Mrs. A. T. Slosson.

II. PROXIUS Stal, 1873, 139.

Small elongate-oval species having the head, pronotum and scutellum coated with a pale hard incrustation which forms peculiar shaped callosities as shown in fig. 66; upper surface of head with a cavity each side for reception of a part of the antennæ in repose; antennæ short, joint 1 stout, reaching or slightly passing tips of apical lobes of head, 2 oval, shorter than 1, 3 slender, filiform, 4 fusiform, pilose at tip; pronotum subquadrate, its base subtruncate, disk with a transverse im-

pression slightly behind middle, front angles more prominent than hind ones, often ending in obtuse spines; membrane of nearly the same texture as corium, the veins of both vague or wanting; sides of abdomen not dilated or lobed; posterior apical angle of sixth dorsal prolonged. Five species are known, all southern in distribution, two of which occur in Florida.

KEY TO EASTERN SPECIES OF PROXIUS.

- a.* Third antennal one-half longer than second; middle of scutellum with a T-shaped elevation. 250. *GYPSATUS*.
aa. Third antennal twice as long as second; middle of scutellum with a reversed T-like elevation. 251. *SCHWARZII*.

250 (399). *PROXIUS GYPSATUS* Bergroth, 1898, 100.

Elongate, subparallel. Reddish-brown, above thickly coated with a clay-yellow crust; corium dull white; membrane and apical angles of connexivals tinged with fuscous; antennæ and legs reddish-brown. Vertex of head with sides dilated and projected outward beyond eyes, the callosities forming an elongate triangular plate on middle of head. Joints 3 and 4 of antennæ subequal in length. Pronotum as under generic heading, the incrustation forming a large bifid elevation on front half of disk, four small obtuse tubercles along its basal margin, a ridge along each side margin and a conical tubercle on each front angle. Scutellum with median ridge as in key, the sides also thickened. Length, 3.5—4.5 mm.

St. Augustine, Fla. (*U. S. N. Mus.*). The types of Bergroth were from "Florida," and Venezuela. Known elsewhere only from Guatemala and Panama.

251 (400). *PROXIUS SCHWARZII* Heidemann, 1904, 230.

Elongate-oval. Reddish-brown covered in some places with a yellowish-white incrustation; legs light brown, femora darker towards tip. Head about as long as broad, in its middle a longitudinal ridge with a large hole at its broader end, each side of ridge with a long deep excavation; tylus much shorter than apical lobes of head; antenniferous processes strongly spined and curving inwardly, reaching middle of first antennal. Joint 1 of antennæ stout, slightly surpassing apical lobes of head, 2 oval, shorter than 1; 3 very thin, about twice as long as 2, 4 nearly as stout and long as 1. Pronotum and scutellum with encrusted ridges as in key and fig. 66. Abdomen one-third longer than broad, narrower at base than before the apex, last segment with sides deeply sinuate, the posterior apical angle acute. Length, 4.5 mm. (Fig. 66).

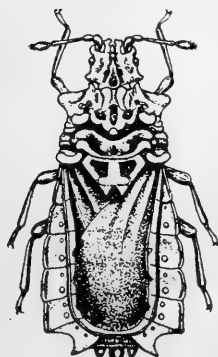


Fig. 66, female, X 10.
(After Heidemann).

The foregoing are the salient features of the original description. It is known only by the unique female type taken at Tampa, Fla., April 27, 1875.

III. PICTINUS Stal, 1873, 140.

In structure and general appearance our only member of this genus is closely allied to *Neuroctenus* but differs in the lack of a carina on sides of ventrals 3—5 and in having the third antennal distinctly longer than second. From *Ancurus*, the only other genus having the membrane devoid of veins, it is easily known by the scutellum being triangular with apex acute and by the fourth antennal being shorter than third. Our species has the base of thorax squarely truncate instead of "subrotundato-truncato" as stated by Stal in his key to genera. One of the eight known species occurs in the southern states, the others in Central and South America.

252 (402). PICTINUS AURIVILLII Bergroth, 1887, 247.

Elongate-oblong, slightly wider behind the middle. Above reddish-brown, the membrane and scutellum somewhat darker; connexivals each with basal half dull yellow; under surface and legs brownish-yellow, the genital region darker. Antennæ reaching only to middle of pronotum, reddish-brown, the apex of fourth joint paler; joint 1 stout, subclavate, slightly surpassing tip of tylus; 2 slightly shorter and more slender, two-fifths the length of 3, the latter longest, twice the length of 4. Head relatively small, slightly longer than wide, narrower than front margin of pronotum; antenniferous tubercles prominent, conical, obtuse; post-ocular ones obsolete. Pronotum subquadrate, one-half wider than long, sides sinuate in front of middle, front margin concave, disk finely and evenly granulate, the transverse impression wide, shallow, ill-defined. Scutellum broadly triangular, its margins thickened and disk with obtuse percurrent median carina. Connexivum very broadly exposed. Membrane finely rugulose without distinct veins. Length, 4.5 mm.

Crescent City, Fla., taken from beneath bark of dead orange trees (*Cornell Univ. Coll.*). Known elsewhere only from Georgia and Bayou Sara, La.

IV. NANNIUM Bergroth, 1898, 100.

Very small oblong or oblong-oval species having the head short, broad; antennæ slender, nearly as long as head and thorax united; beak reaching base of head, its groove wide with sides parallel; pronotum with sides deeply emarginate, forming a rounded front lobe, hind margin trisinate; scutellum broadly triangular, its base nearly as wide as pronotum. Five

species are known, four from South and Central America, the other occurring in our territory.

253 (403). *NANNIUM PUSIO* Heidemann, 1909a, 189.

Oblong. Pale reddish-brown, nearly uniform; tips of antennal joints and of femora and tibiæ narrowly paler. Head as long as broad; tylus very short, scarcely reaching middle of first antennal; impressions of vertex oval, deep; antenniferous spines short, triangular, divergent; antennæ with first joint strongly curved, its apical half much enlarged, second and fourth subequal, each about one-half the length of third. Pronotum deeply emarginate near middle, its margins very finely dentate, front portion of disk with four short carinæ or tubercles. Scutellum broadly triangular, disk with a median lengthwise carina, each side of which is a small triangular space with raised margins. Male with sides of abdomen parallel, middle of ventral segments subequal in length, genital segment very short, convex, its lobes narrow. Length 3—3.6 mm.

Cincinnati, Ohio, Oct. 2 (*Davis*). Described from there and not known elsewhere. Taken by sifting earth near an old decaying tree stump.

V. *MEZIRA* Amyot & Serville, 1843, 305.

Species of medium size and oval form having the head as long as or longer than broad; tylus stout, not surpassing apex of first antennal, its sides embraced by the cheeks, which are contiguous in front of it; antenniferous spines short, broad, triangular, divergent; impressions of vertex broad, shallow; antennæ shorter than head and pronotum united, first joint slender at base, much enlarged beyond middle, third one, in our species (subgenus *Arictus*) distinctly longer than second; beak reaching base of head, its groove wide, shallow, with sides parallel; pronotum with sides more or less sinuate or emarginate, disk coarsely granulate, its front portion with four carinæ or obtuse elevations; scutellum broadly subtriangular, its apex narrowly rounded, disk usually with an evident lengthwise median carina; corium but little longer than scutellum; ventrals without a keel between spiracles and side margins, but usually with a distinct ridge lying just within the spiracles. Male with fifth ventral much narrowed at middle, sixth longest at middle, seventh visible, very short, its lobes narrow, subspatulate; genital segment short, very convex. Our members of this genus were formerly included under the name *Brachyrhynchus* Lap., which Bergroth (1906, 202) showed was preoccupied. The genus is a large one, 20 species, mostly from the tropical regions being recognized by Stal (1873, 143), and 14

from Central America being described as new by Champion (1898, 91). Three of the four North American species listed by Van Duzee occur in the eastern states and another has since been described.

KEY TO EASTERN SPECIES OF MEZIRA.

- a.* Larger, length, 7 or more mm.; scutellum with median carina distinct; head and pronotum rather sparsely granulated.
- b.* Sides of pronotum deeply concave before the middle, the carinæ of its front portion rather strongly elevated; color dull reddish-brown. 254. LOBATA.
- bb.* Sides of pronotum shallowly concave, the carinæ of disk low, ill defined; color dark reddish to blackish brown. 255. EMARGINATA.
- aa.* Smaller, not over 5.5 mm.; head and pronotum densely granulated.
- c.* Scutellum densely and evenly granulated, without elevation at base, the median carina obsolete or very faint. 256. GRANULATA.
- cc.* Scutellum with smooth transverse elevation at base, disk divided by a distinct entire longitudinal median carina. 257. NOVELLA.

254 (404). MEZIRA LOBATA (Say), 1832, 30; I, 354.

Oblong-oval. Dull reddish-brown tinged with fuscous; hind margins and edges of connexival segments often more or less yellow; disk of dorsal surface of abdomen dull reddish-yellow. Head about as wide as long, shorter than pronotum; tylus stout, reaching apical fourth of first antennal, its tip obtuse, subtruncate; antennæ more slender than in *emarginata*, third joint one-half longer than either second or fourth, which are subequal. Pronotum with a deep transverse groove; side margins with a deep sinuation or concavity in front of middle, their front portion somewhat produced and reflexed, forming a rounded lobe, hind one with sides subparallel; front portion of disk with four elevated, oblique carinæ, hind portion rather sparsely, coarsely granulated. Scutellum broadly triangular, its apex narrowly rounded; sides feebly elevated, disk with a distinct but low median longitudinal carina. Corium with both outer and apical margins feebly sinuate. Other characters as under generic heading. Male as there; female with basal genital plates long, very rugose; dorsal genital three times as wide as long, its hind margin concave. Length, 7.5—8.5 mm.

Scarce throughout the southern half of Indiana, Porter County only in the north, April 6—Dec. 16. Hibernates beneath bark, especially that of dead elms and oaks and in spring and summer occurs beneath chunks in low moist woods and on a whitish fungus growing beneath bark. Ranges from New York to Michigan and California and south and southwest to Georgia, Florida and Texas. The only Florida record is that of Osborn

(1903, 40) and may have been based on a specimen of *emarginata*.

255 (405). MEZIRA EMARGINATA (Say), 1832, 30; I, 354.

Resembles *lobata* but averaging larger and darker; tylus narrower and more rounded at tip; antennæ stouter and slightly shorter, the relative length of the segments about the same. Pronotum with the transverse impression less deep, the notch on sides much less acute, the front lobe smaller and less prominent, the carinæ of front portion lower and more irregular, and the granulations of surface, especially the edges, coarser and more regular. Length, 8—9 mm.

Dunedin and Istokpoga, Fla., March 27—April 10 (*W. S. B.*). Cape Hatteras and Fayetteville, N. Car., January—June (*Brimley*). The Florida specimens were taken beneath rubbish or by sweeping along the margins of woodland ponds and lakes. Described from Mexico and recorded from Jacksonville, Fla. by Barber; also from Mississippi, New Mexico, Nevada and California by Van Duzee. The specimens at hand are much darker than those of *lobata* from Indiana, but are dark reddish-brown, not black as stated by Say. The indentation of margin of pronotum is a deep, obtuse sinuation rather than a notch as in *lobata*. This is the "*M. modesta* Stal," recorded by Sherman (1905, 8) from Cape Hatteras, N. Car. That is a Mexican species known in the United States only from Wyoming, Arizona and California. It differs from *emarginata* in having the antennæ more slender with third joint longer, side margins of pronotum not or very faintly sinuate and scutellum without carinæ.

256 (407). MEZIRA GRANULATA (Say), 1832, 30; I, 353.

Oblong-oval, densely granulate above. Pale to dark reddish-brown; membrane whitish clouded with fuscous. Head as long as broad; tylus rather slender, reaching almost to apex of first antennal, its tip rounded; antennæ slender, second and fourth joints subequal, each but slightly more than half the length of third. Pronotum with transverse impression shallow, side margins sinuate near middle, disk without well defined anterior lobe; elevations of front portion low, very irregular. Scutellum broadly triangular, narrowly rounded at tip, the median carina very faint. Length, 4.8—5.5 mm.

Southern half of Indiana, frequent, April 2—Sept. 20; not taken north of Marion County. Bassenger, LaBelle and Dunedin, Fla., November—March (*W. S. B.*). Washington D. C., and Rabun Co., Ga., April—July (*Davis*). Numerous stations in North Carolina (*Brimley*). Occurs mainly beneath bark of dead water and red oaks; in Florida also beneath that of pine and the boot-jacks of cabbage palmetto. Scores in all stages have

been taken in the winter from single colonies near Dunedin. Say mentions it as "common in Florida," and it is recorded definitely from Crescent City and Enterprise by Barber. Ranges from Maryland west to Missouri, and south and southwest to Florida and Texas. Uhler (1878, 420) also records it from Cuba and Bergroth from Mexico.

257 (—). MEZIRA NOVELLA Blatchley, 1924, 88.

Elongate-oblong. Dark reddish-brown, under surface and dorsum of connexivum paler; membrane fuscous with a vague pale spot at base.

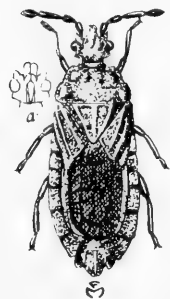


Fig. 67. X 7½.
a, under side of head showing short beak. (Original).

Head as long as wide across the eyes; tylus almost reaching apex of first antennal; antenniferous spines small, triangular, acute; vertex coarsely, unevenly granulated, the impressions very small; postocular tubercles distinct, obtuse; antennæ stout, distinctly shorter than head and pronotum united, joints 1, 2 and 4 subequal in length, 3 one-half longer. Pronotum subtrapezoidal, sides distinctly not deeply sinuate near middle, margins finely reflexed, median transverse impression evident, ill-defined; disk with front portion bearing four oval or lozenge shaped low but distinct tubercles, hind portion finely and densely granulated. Scutellum triangular, much narrower than in *granulata*, the apex more acute; disk as described in key. Abdomen narrow, the sides parallel. Ventral segments with the usual ridge lying just within the spiracles very faint. Genital segment of male subtriangular, obtuse behind, carinate and subimpressed each side above, lobes narrow, very small. Length, 4.5 mm.—4.8 mm. (Fig. 67).

men narrow, the sides parallel. Ventral segments with the usual ridge lying just within the spiracles very faint. Genital segment of male subtriangular, obtuse behind, carinate and subimpressed each side above, lobes narrow, very small. Length, 4.5 mm.—4.8 mm. (Fig. 67).

Cape Sable, Fla., Feb. 25—28; a dozen or more specimens beneath bark of decaying limbs in dense hammocks. Smaller and paler than *granulata*, with sculpture of scutellum very different. Pronotum with side margins narrower, less reflexed, their apical lobe much less pronounced; front portion of disk with tubercles more distinct, hind one much more finely and densely granulated.

VI. NEUROCTENUS Mayr, 1866, 365.

Oval or elongate-oval species of medium size differing from *Mezira* in having the antennal segments more subequal in length, the third but slightly longer than the others; pronotum with side margins entire or nearly so, disk without median transverse impression or carinæ; scutellum broadly triangular, the basal margin longest; abdomen very flat, the ventrals each with a carina between the spiracles and side margins. Four North American species are known, all occurring in our territory.

KEY TO NORTH AMERICAN SPECIES OF *NEUROCTENUS*.

- a. Apex of head not apparently cleft, the cheeks rounded and contiguous in front of tylus.
 - b. Color blackish-brown; scutellum without trace of carina on apical half; smaller, length, 4.5—6 mm. 258. *SIMPLEX*.
 - bb. Color dark reddish-brown; scutellum with a faint median carina on apical half; larger, length 5.5—6.5 mm. 259. *ELONGATUS*.
- aa. Apex of head distinctly cleft in front, the cheeks surpassing tylus, not contiguous in front of it.
 - c. Abdomen broadly ovate; hind portion of scutellum granulate, not rugose; length, 6—7 mm. 260. *PSEUDONYMUS*.
 - cc. Abdomen with sides parallel; hind portion of scutellum distinctly transversely rugose; length, 5.8—6.2 mm. 261. *HOPKINSI*.

258 (408). *NEUROCTENUS SIMPLEX* (Uhler), 1876, 323.

Oblong-oval. Dark reddish-brown to blackish, finely and densely granulated; membrane usually whitish-hyaline with two fuscous stripes, often in great part clouded with fuscous; beak, apical half of fourth antennal, coxæ and tarsi dull yellow. Head about as long as wide, tylus reaching apex of first antennal; antenniferous spines short, conical, acute, divergent; antennæ short, stout, third joint slightly longer than second. Pronotum trapezoidal, the side margins straight, oblique from apex to basal third, thence subparallel to base; disk finely and unevenly granulated, the front portion usually with three or four small oval, slightly raised nearly smooth spaces. Scutellum broadly triangular, evenly and densely granulated throughout. Male with genital segment short, swollen, bluntly rounded, impressed above. Length, 4.5—6 mm.

Frequent throughout Indiana, March 5—Oct. 10; Dunedin and Cape Sable, Fla., November—April (*W. S. B.*). Numerous stations in New York and New Jersey (*Davis*). This is in both Indiana and Florida the most common of our “flat-bugs,” occurring sometimes by hundreds beneath the bark of red and black oaks in the former State and beneath that of water oak and pine in the latter. It is also often beaten from bunches of Spanish moss and has been swept from the flowers of asters and other *Compositæ* in autumn. Heidemann (1904a, 162) says of it: “This is the commonest species of the *Aradids* known in the United States. Fresh specimens have the membranous parts of the elytra silvery-white with a short dark streak at base, sometimes running down to the middle and forming an irregular spot.” Osborn states that it is sometimes taken in Ohio under bark of beech. Barber records it only from Biscayne Bay and Lakeland, Fla., but, judging from its abundance about Dunedin, it must occur throughout the State. The known range of the species extends from Maine and Massachusetts west to Missouri and southwest to Florida, Texas and

Cuba. The Florida specimens are distinctly darker in hue than those from Indiana.

259 (410). *NEUROCTENUS ELONGATUS* Osborn, 1903, 41.

Very close to *N. simplex*; slightly larger and paler. Above dark brown, the edge of abdomen paler reddish-brown; membrane brown with two paler spots at base; under surface reddish-brown, the femora darker. Tylus slightly exceeding tip of first antennal, its apex slightly notched; antenniferous spines strongly divergent, their tips acute; antennal joints subequal. Pronotum as in *simplex*, the side margins slightly sinuate in front of middle. Scutellum as there but the apical half with faint carina. Male with genital segment broad oval, its hind margin subangulate and lobes small; female with lateral lobes as seen from above, slightly longer than the middle one which is obtusely rounded and notched at apex. Length, 5.5—6.5 mm.

Lake, Fountain, Jackson Posey and Crawford counties, Ind.; April 19—Nov. 8. Raleigh, N. Car., July (*Brimley*). Washington, D. C. (*Gerhard*). Occurs beneath bark of oak. Recorded from Ohio, Pennsylvania and North Carolina.

260 (409). *NEUROCTENUS PSEUDONYMUS* Bergroth, 1898a, 27.

Broadly ovate. Above blackish-brown, the sides of abdomen slightly paler, membrane with two pale spots at base; beneath reddish-brown, femora darker, beak, coxæ and tarsi paler. Head slightly longer than broad, cheeks distinctly surpassing tylus, slightly exceeding first antennal, their tips not contiguous; antenniferous spines acute, strongly divergent; spinous process behind eyes distinct, acute; third joint of antennæ more slender and slightly longer than second. Pronotum with front side margins slightly sinuate, distinctly not strongly reflexed, front angles rounded; disk, as also that of scutellum, roughly granulated. Abdomen dilated, broadly oval. Male with genital segment oval, broader than long, its hind margin broadly rounded, lobes very small; female with dorsal genital lunate, its lobes very broad, concave above. Length, 6—7 mm.

Posey Co., Ind., April 10—May 10 (*W. S. B.*). Cincinnati, Ohio, May 7 (*Davis*). In Posey County it was taken in some numbers beneath decaying chunks in low damp places. Known elsewhere from District of Columbia and North Carolina. Heidemmann (1904a, 163) records it as occurring near Saluda, N. Car., beneath bark of a decaying chestnut log and says: "It is more robust and broader in body than any other of our species of *Neuroctenus*." It is the *N. ovatus* Stal of Osborn and other authors.

261 (411). *NEUROCTENUS HOPKINSI* Heidemmann, 1904a, 163.

Elongate-oval. Dark reddish-brown, opaque; membrane blackish with two triangular yellow spots at base near tip of scutellum and one

each side adjoining tip of corium; beak, tarsi and apical half of fourth antennal, dull yellow. Cheeks exceeding tylus, their tips slightly enlarged and divergent; head behind eyes rounded, without spinous process; antennæ and antenniferous spines as in *pseudonymus*. Pronotum trapezoidal, side margins evidently but not deeply sinuate, not reflexed; disk rather coarsely and evenly granulated. Scutellum broadly triangular, its apex narrowly rounded; disk granulated from base to middle, then transversely wrinkled. Genital segment of male, broad, oval, hind margin subangulate, lobes small; of female with lateral lobes rounded, middle lobe transverse, its hind margin rounded, entire. Length, 5.8—6.2 mm.

Plummer's Island, Md., April 24 (*Gerhard*). Clayton, Ga., June (*Davis*). Described from North Carolina and hitherto recorded only from that State. The rounded and non-spinous postocular portion of head and rugose surface of hind portion of scutellum are its principal distinctive characters. It is also less shining than our other species, with antennæ relatively shorter and stouter, both they and head very coarsely granulated.

VII. ANEURUS Curtis, 1825, 86.

Small oblong or oval, brown or blackish species having the surface smooth or minutely granulated; head as broad or slightly broader than long, tylus equalling or slightly exceeding the cheeks; antenniferous spines very short, acute, sometimes subobsolete; impressions of vertex broad, oval, shallow; antennæ slender, first joint stoutest, fourth longest; beak very short, not reaching hind margin of eyes, its sulcus lanceolate; pronotum subtrapezoidal, margins entire or very finely denticulate, not reflexed, disk with an evident but ill-defined transverse median impression; scutellum as wide or wider at base than long, its apex broadly rounded, edges not elevated; membrane without visible veins; ventral surface very flat, segments without rugæ or keels. Seven species are known from North America, all of which occur in our territory.

KEY TO NORTH AMERICAN SPECIES OF ANEURUS.

- a. Antenniferous spines wanting or very short and obtuse.
 - b. Joints 1—3 of antennæ subequal in length, 4 subcylindrical, as long as 2 and 3 united; postocular spines prominent, acute; terminal genital segment of male wider than long, not surpassing the lobes at sides. 262. *POLITUS*.
 - bb. Joints 1—4 of antennæ gradually increasing in length, the second one-half longer than first, 4 fusiform; postocular spines obtuse; terminal genital segment of male oblong, convex, surpassing the lobes. 263. *TENUICORNIS*.

aa. Antenniferous spines distinct, short, acute.

c. Third joint of antennæ three-fourths or more the length of fourth; length, 5.5 or more mm. 264. *INCONSTANS.*

cc. Third antennal not more than one-half the length of fourth; length not more than 5.3 mm.

d. Second antennal distinctly longer than basal one; fourth more than twice as long as third; terminal genital of male obtusely triangular, granulate above, shorter than the lobe.

265. *SIMPLEX.*

dd. Second antennal not longer than basal one; fourth not more than twice as long as third.

e. Second antennal as long as basal one, the latter not as broad as tylus; length, 4.5—4.8 mm. 266. *SEPTENTRIONALIS.*

ee. Second antennal shorter than basal one, the latter broader than tylus.

f. Color pale reddish-brown; length not over 3 mm.

267. *MINUTUS.*

ff. Color dark reddish-brown; length, 3.6—4 mm. 268. *FISKEI.*

262 (412). *ANEURUS POLITUS* Say, 1832, 31; I, 354.

Elongate-oval strongly depressed. Uniform dark reddish-brown; basal half of pronotum, scutellum and elytra dark chestnut brown. Head as wide as long, finely granulated, eyes small, not prominent; antennæ as in key, joint 1 stoutest. Pronotum with sides in front of the obtuse but prominent humeral angles broadly concave; hind margin subtruncate; front half of disk shining, its sides sparsely rugose; hind one finely strigose granulated, more so on the middle depression. Scutellum finely concentrically strigose, broader at base than long, its apex less broadly rounded than in our other species. Elytra finely rugose, not strigose. Legs very short, femora subclavate. Other characters as in key. Length, 4.5—4.7 mm.

Capetillo, Guatemala (*British Mus. Coll.*). Described from Florida and recorded by Barber from St. Augustine and Bellaire. Known also from Cuba and Central America. Larger and more oval than *tenuicornis*, head wider, antennæ shorter and stouter, scutellum longer with apex narrower.

263 (418). *ANEURUS TENUICORNIS* Champion, 1898, 116.

Elongate-oval. Pale to dark chestnut-brown, shining; very minutely strigose-granulate. Head as long as broad; tylus surpassing first antennal, the latter short, sublobose; antennæ as in key, joint 4 one-half longer than 2 and 3 united. Pronotum with sides rather strongly sinuate, its front portion distinctly narrower than hind one, front angles narrowly rounded. Scutellum almost semicircular, densely, minutely strigose, a smooth obtuse median carina on basal half. Male genital segment as in key, slightly wider at base, apex obtuse, the lobes very narrow; female with dorsal genital semicircular, truncate behind, lobes very short. Length, 3.7—4 mm.

Dunedin, Fla., Jan. 8—April 3. Taken from beneath boards in low moist places and from beneath bark of dead limbs of oak and red bay. Spring Hill, Ala., May 2 (*Gerhard*). Haw Creek, Fla. (*Cornell Univ. Coll.*). Described from Guatemala and Panama and hitherto recorded from the United States only from Georgia.

264 (414). *ANEURUS INCONSTANS* Uhler, 1871, 105.

Oblong-oval. Dark reddish-brown; head, antennæ, pronotum and scutellum usually fuscous; corium sometimes with a whitish spot at middle. Head as wide as long; tylus reaching apical fourth of first antennæ; antenniferous spines visible but very short, acute; antennæ rather stout, nearly as long as head and pronotum united, second joint slightly longer and more slender than first, third but slightly shorter than fourth. Pronotum with side margins widely and shallowly sinuate, their edges not reflexed, minutely denticulate; disk finely and densely granulated. Scutellum not wider at base than long, disk finely transversely wrinkled and with a faint oblique, abbreviated carina each side. Male genital segment oval, convex, its apex broadly rounded, lobes slightly shorter, triangular, their apex subtruncate, much wider than base; female dorsal genital sublunate, concave behind, genital lobes scarcely visible from above, the hind margin of second genital truncate. Length, 5.5—6.3 mm.

Lake Co., Ind., May 5 (*H. S. B.*). Rockaway Beach, Tarbel, DeBruce and East Jewett, N. Y.; Schooley's Junction, N. J., May 21—July 6 (*Davis*). Ranges from Quebec and New England west to Indiana. Van Duzee (1894, 182) took it in all stages at Buffalo under dead birch bark, February and April.

265 (415). *ANEURUS SIMPLEX* Uhler, 1871, 106.

Elongate-oval. Pale reddish-brown; elytra, including membrane, dull white. Head as wide across eyes as long; vertex transversely strigose; tylus stout, cylindrical, its front portion elevated above, but not much surpassing the slender tips of cheeks; postocular tubercles prominent. Antennæ scarcely as long as head and pronotum united, joint 1 oblong, its base very slender; 2 and 3 subequal in length, each more slender and one-third longer than 1, the base of 2 tapering; 4 slightly stouter, pilose, about as long as 2 and 3 united. Pronotum nearly twice as wide as long, constricted and with a distinct transverse impression in front of middle; front lobe with four or five flat oval callosities, side margins minutely denticulate, hind one truncate, front angles obtusely rounded. Scutellum finely and very irregularly strigose, without carina, its apex broadly rounded. Dorsal genital of female trapezoidal, truncate behind. Length, 5—5.3 mm.

Dilly, Ore. (*Barber*). Hoquiam, Wyo., on *Picea sitchensis* (*Bong.*); Denver, Colo. (*Cornell Univ. Coll.*). A species of northern range recorded only from Vermont, Massachusetts and Washington.

266 (413). *ANEURUS SEPTENTRIONALIS* Walker, 1873, 30.

Elongate-oval. Color a nearly uniform pale reddish-brown; head and pronotum somewhat darker. Head as wide across eyes as long, tylus large, prominent, surpassing cheeks by half its length; antenniferous spines short, divergent, subacute. Antennæ as in key, joint 4 twice as long as 3. Pronotum trapezoidal, two-thirds wider at base than long, apex and side margins concave, hind one truncate; disk with a broad shallow transverse groove at middle, and with an oblong transverse elevation behind each front angle and before each hind one. Scutellum almost semicircular, its apex very broadly rounded, disk finely rugose. Length, 4.5—4.8 mm.

One without locality from Osborn collection. Recorded from Nova Scotia, Quebec and Ontario.

267 (416). *ANEURUS MINUTUS* Bergroth, 1886, 58.

Oblong-oval. Color dimorphic, usually a uniform, rather pale reddish-brown, minutely and densely granulated; sometimes with head, pronotum and scutellum blackish-brown, the elytra then pale whitish hyaline, the corium narrowly dark at base. Head slightly wider than long; tylus short, stout, reaching apex of first antennal; antenniferous spines very short, acute, divergent; antennæ with joints 1 and 3 subequal in length, 2 shorter, 4 twice or more the length of 3. Pronotum with side margins entire, sinuate in front of middle; disk rugose or tuberculate in front, minutely granulate behind. Scutellum with base truncate, sides and apex broadly rounded, disk minutely granulated, a very fine basal carina each side. Abdomen with sides subparallel, male, just visibly curved, female. Genital segment of male convex, subquadrate, very short, lobes minute, barely evident above; female with dorsal genital semicircular, feebly impressed above. Length, 2.7—3 mm.

Dunedin and Cape Sable, Fla., Dec. 31—April 3. Taken at Dunedin, Jan. 8, by scores and in all stages from beneath the thin bark of a dead sprout of red bay, *Persea borbonia* L.; also on numerous other occasions by beating dead vines, dead oak limbs, and the foliage of the scurfy Ericad, *Nolisma ferruginea* (Walt.). Heidemann (1904a, 164) records it from Brunswick, Ga., where it was "found April 26, in deserted galleries of a small Cerambycid in dead branches of Sumac." He also notes its occurrence in southern Florida, but it is not included in Barber's 1914 Florida list. Aside from these two states it is known from Texas, Arizona, Mexico and the West Indies. Osborn mentions it as having been taken at Cincinnati, Ohio, but this record may have been based on a wrong identification. Of the 16 specimens at hand five, all males, are of the dark form with white elytra.

268 (417). *ANEURUS FISKEI* Heidemann, 1904a, 164.

Oblong-oval. Dark reddish-brown, finely granulose; middle of corium usually with a transverse yellow spot. Head slightly longer than broad; tylus reaching apical third of first antennal; antenniferous spines short, acute, curved; antennæ slender, about twice the length of head, basal joint oval, very stout, second similar but more slender and shorter, third and fourth cylindrical, the latter slightly longer than second and third united. Pronotum with distinct transverse impression, margins feebly sinuate in front of middle; disk very finely granulose, the hind portion vaguely rugose. Scutellum slightly wider than long, sides broadly rounded from base to apex, disk with a fine but distinct carina each side. Genital segment of male oblong, convex, obtuse, slightly surpassing the small spatulate lobes. Length, 3.6—4 mm.

Marion Co., Ind., June 16; one male beaten from prickly ash, *Xanthoxylum americanum* Mill. Staten Island, N. Y., June 28 (*Davis*). Described from Tryon, N. Car., and recorded from Connecticut, New York, Pennsylvania, Virginia and Georgia. Heidemann (loc. cit.) states that the types "were collected beneath bark of decaying branches of sourwood (*Oxydendrum*) and also beneath loose bark scales on the dry branches of sycamore." At White Plains, N. Y., Bueno (1908a, 227) found it under bark of dead hardwood trees, oaks, hickory, etc., preferably saplings and smaller branches.

Family X. *NEIDIDÆ* Kirkaldy, 1902, 302.

THE STILT-BUGS.

Elongate, very slender Heteroptera of a pale color, having the head conical, porrect, declivent in front; eyes small, distant from its base; ocelli present; vertex with a transverse sulcus in front of them; antennæ four-jointed, elongate, filiform, elbowed at the end of the very long first joint, the latter and the femora clavate, fourth joint much the shortest, fusiform; beak slender, four-jointed, reaching or exceeding middle coxæ; pronotum much longer than wide, convex behind, the disk with margins carinate and with a more or less entire median carina; scutellum very small, often armed; elytra long, narrow, the costal edge of the corium prolonged much beyond the middle of the membrane; legs very long and slender, more or less thickly beset with short bristles; metathorax (in our eastern species) with a distinct osteolar canal or groove running from the coxal cavity outward to an osteolar tubercle which is sometimes long and spine-like; tarsi three-jointed.

This family was until recent years treated as a subfamily of the Coreidæ. By some authors it is known as Berytidæ. About 60 species are known, nine of which occur in America north of Mexico. Of these, four species, representing as many genera, occur in our territory. The principal literature treating of them is by: Say, 1824, 1832; Stal, 1874; Van Duzee, 1909, 1914; Barber, 1911a; McAtee, 1919a.

KEY TO EASTERN GENERA OF NEIDIDÆ.

- a.* Head elongate and with a porrect decurved spine between the bases of antennæ; elytra in great part coriaceous, the clavus and corium strongly punctate; scutellum without a spine; osteolar tubercle low, not spined. (Subfamily *Neidinæ*). I. NEIDES, p. 332.
- aa.* Head shorter, without a decurved spine; clavus and corium in great part hyaline with but few punctures; scutellum with a distinct spine. (Subfamily *Metacanthinæ*).
- b.* Front of pronotum without an erect spine each side; osteolar process long, more or less spine-like; tibiæ not annulate.
- c.* Front coxæ separated by a distinct sulcate area; fourth joint of antennæ longer than head; osteolar process not curved or twisted, the canal ending on its outer side. II. JALYSUS, p. 333.
- cc.* Front coxæ contiguous or nearly so; fourth antennal about as long as head; osteolar process curved and twisted so that the canal ends on its upper side. III. AKNISUS, p. 334.
- bb.* Front of pronotum with an erect sharp spine each side; osteolar tubercle low, not at all spine-like; tibiæ banded with black. IV. PROTACANTHUS, p. 335.

I. NEIDES Latreille, 1802, 246.

Here belongs a single slender species having the vertex of head produced into a strongly deflexed spine or process which, however, scarcely reaches the middle of the declivent tylus; pronotum without spines, the median carina confined to basal portion; elytra reaching tip of abdomen, the costal margin to middle of sixth ventral; front coxæ well separated; under side of neither head nor prosternum with a sulcus, the position of beak usually limited each side by a heavy line of whitish granules; meso- and metasterna with a deep groove bordered each side by similar granules. Other characters as in generic key.

269 (419). NEIDES MUTICUS (Say), 1832, 13; I, 328.

Dull straw-yellow; disk and side margins of hind lobe of pronotum and base of corium sometimes with vague blackish markings; last joint of antennæ, tips of tibiæ and tarsi and groove of meso- and metasterna black or fuscous. First and third joints of antennæ subequal in length, second nearly one-half shorter. Pronotum densely and coarsely punc-

tate, the carinæ each ending behind in a small tubercle. Elytra with membrane relatively short, finely, transversely rugose. Length, 8.2—9.5 mm.

Lake and Porter counties, Ind., Aug. 1—28 (*Gerhard*). Snicker's Gap, Va. (*Davis*). Algonquin, Ill., May 20 (*Hart*). Blowing Rock, N. Car., April 9 (*Brimley*). Canaan, Mass., July 12 (*Frost*). The general range of this species is northern, extending from Quebec and New England north of the 42nd Parallel, westward across the continent. South of the Ohio River it is definitely recorded only from the mountains of North Carolina and Georgia. A specimen in the National Museum is labelled "Duvall Co., Fla.," but McAtee expresses doubt as to its coming from there. It is also known from Kansas, Arizona and California. Uhler calls it "the subalpine analogue" of *Jalysus spinosus* Say, and states that on Aug. 5 in eastern Colorado he found them "flying in the bright sunlight and they might easily have been taken for *Tipulidæ*." About Buffalo, N. Y., Van Duzee (1894, 172) says they "are common in weedy fields and pastures. The summer brood appears about August

1st, and is taken in winter hibernating." The North Carolina specimen at hand has an oblong blackish mark on disk of hind lobe of pronotum and the clavate tips of femora are brownish. The sulcus of sterna also lacks the whitish granules usually found along the sides, but the structural characters agree in all respects with typical *muticus*.



Fig. 68, X 3. (After Lugger).

II. JALYSUS Stal, 1862, 59.

Very slender species having the head sparsely punctate and (in our eastern one) without spines; pronotum densely and coarsely punctate, the front portion with two smooth callosities, the hind lobe strongly convex; scutellum with a short, sharp inclined spine; elytra in great part hyaline, reaching base of sixth dorsal, clavus transversely rugose; beak reaching onto metasternum, its sulcus obsolete on head, narrow

between the front coxæ, much widened behind them, contracted again between middle coxæ and widened on metasternum, its edges sharply carinate; osteolar process ending in a spine. A half dozen species are known, two of them and one variety from North America. One species occurs east of the Mississippi.

270 (421). *JALYSUS SPINOSUS* (Say), 1824, 28; I, 28.

Dull reddish-brown or brownish-yellow; last antennal joint (except base and apex), apex of corium, tips of tarsi and often sterna and stripes on venter blackish-fuscous. First joint of antennæ distinctly longer than third, second only twice the length of fourth. Spine of scutellum inclined at an angle of about 45 degrees. Length, 7—9 mm. (Fig. 68).

Frequent throughout Indiana, much more so in the southern portion; Feb. 25—Sept. 18. Dunedin, Fla., Nov. 18—April 3. In Indiana it hibernates beneath logs, leaves of mullein and other cover, and may be taken by sweeping in early April. In summer it occurs most frequently on the weeds and underbrush of woodland and the tall grasses about the edges of ponds and fields. In Florida, where it is much less common than in the north, it also seeks cover during the winter months, but is taken by sweeping in November and March. It has been heretofore recorded only from Crescent City, Clearwater and Lakeland in that State. The known range of *spinosus* is in general more southern than that of *N. muticus*, extending from Quebec and New England west to Michigan and Kansas and south and southwest to Florida, Mississippi and Texas. In the central and southern states it is relatively much more common than is *muticus* in the northern ones. From Nebraska westward the eastern form is replaced by the race or variety *wickhami* Van D. (1906, 387).

III. *AKNISUS* McAtee, 1919a, 81.

Here belong two small, very slender species having the head (in our eastern one) armed with a short suberect obtuse spine between the bases of antennæ; beak slightly surpassing middle coxæ; pronotum subcylindrical, elevated behind, disk densely punctate, the carina very low, front portion with a pair of small callosities; elytra almost wholly hyaline, nearly devoid of punctures reaching almost to tip of abdomen; osteolar process as in key, its apex without a spine; prosternum without a sulcus; meso- and metasterna with an ill-defined one, its sides obtusely rounded. One species occurs in our territory, another in California.

271 (420). *AKNISUS MULTISPINUS* (Ashmead), 1887, 155.

Pale straw-yellow; fourth joint of antennæ, except apex, and tips of tibiæ and tarsi, blackish. First joint of antennæ nearly as long as second and third united, second about one-fourth shorter than third. Spine of scutellum nearly erect. Hind femora reaching tip of abdomen, female, slightly surpassing it, male. Length, 5—6 mm.

Crawford Co., Ind., Aug. 29, three specimens swept from the margins of a garden on a high rocky slope at Wyandotte. Dunedin, Fla., Feb. 15—25, three taken by sifting roots of clumps of grass along a sandy road near bay front, and one, April 10, while beating along the edge of a dense moist hammock. Lakehurst, N. J., May 26 (*Davis*). Described by Ashmead from Duval Co., Fla., and also by Van Duzee (1909, 163) as *Jalysus perclavatus*, a synonym, from Crescent City, Sanford, Tampa and St. Petersburg. Outside of Florida it has been recorded by McAtee (1919a, 82) from Missouri, Kansas and Texas. The small size, pale color, spine on head, twisted osteolar process, and lack of dark spot at tip of corium, easily distinguish it from *Jalysus spinosus* (Say).

IV. *PROTACANTHUS* Uhler, 1893, 707.

Head subglobose, strongly convex above; antennæ extremely slender, first joint almost as long as the others united, second and third subequal, fourth fusiform, slender, three-fifths as long as third; beak reaching hind coxæ; pronotum with front margin elevated, produced each side into a straight, sub-erect spine, disk with hind lobe densely punctate, strongly convex, sides and median line with low carinæ; scutellum with a long curved spine; elytra wholly hyaline, slightly surpassing tip of abdomen. Other characters as in key. One species is known.

272 (424). *PROTACANTHUS DECORUS* Uhler, 1893, 708.

Elongate, very slender. Straw-yellow; head shining black; fourth antennal piceous; front margin, carinæ and spines of pronotum whitish; femora sparsely dotted with brown; tibiæ annulate with dark brown or black; tarsi in great part fuscous. Structural characters as above. Length, 3.5—4 mm.

Grenada, West Indies (*U. S. N. Mus.*). A neotropical species described from St. Vincent Island. Known also from Grenada and Jamaica and taken by Van Duzee (1909, 164) at Estero, Fla., May 7. Uhler (1894a, 181) states that in Grenada it was beaten from herbage in late August at altitudes between 200 and 400 feet.

Family XI. LYGÆIDÆ Schilling, 1829, 37.

THE CHINCH-BUG FAMILY.

Small or medium sized oblong or narrowly oval Heteroptera, usually dull in color and having the head subconical, convex above, porrect or feebly declivent, usually inserted in the thorax to the eyes; antennæ slender, four-jointed, longer than head, inserted on the sides of the head slightly below the middle of eyes; ocelli (except in *Cnemodus*) present; beak 4-jointed; pronotum either horizontal or declivent in front, often more or less constricted to form two distinct lobes; scutellum triangular, of moderate size; elytra coriaceous, usually covering the

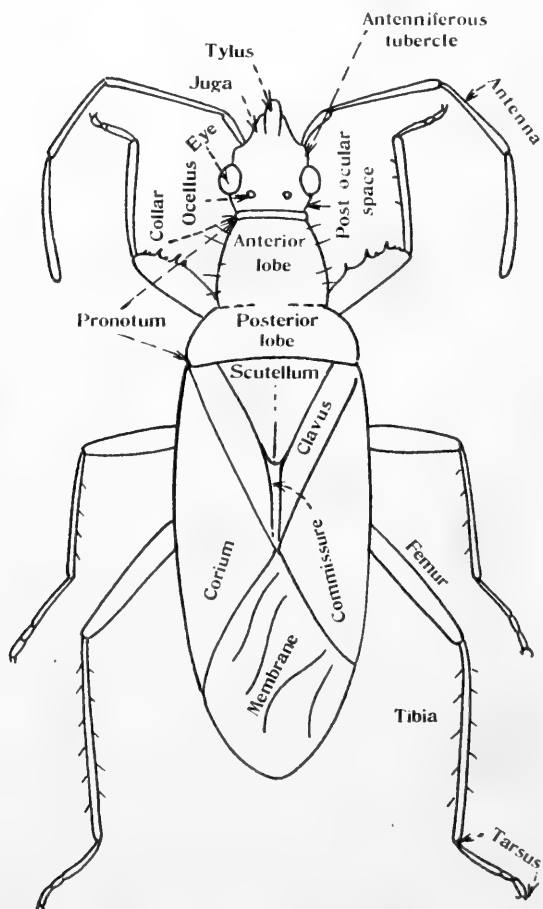


Fig. 69. *Lygrocoris diffusus* (Uhler); dorsal view illustrating Lygæid structures. Greatly enlarged. (After Barber in Hemiptera of Connecticut).

abdomen, rarely brachypterous; claval commissure usually present; connexivum narrowly or not at all exposed; membrane with four or five usually simple veins arising from the base; front femora often swollen and armed beneath with teeth or spines; tarsi 3-jointed; claws with arolia; osteolar openings distinct.

The family is a very large one, about 1,400 species being known. Of these Van Duzee (1917) recognized 187 from America north of Mexico, and a score or more have since been discovered or described. Of these 120 are known or recorded from the eastern states and included in this work. Both in this country and our territory the family, therefore, ranks second, or next to the Miridæ, in number of species. In habits they are for the most part phytophagous, feeding upon the juices of many plants and one of them, the "chinch-bug," *Blissus leucopterus* (Say), is the most injurious Heteroptid known. However, the members of the large subfamily Rhyparochrominæ are thought to be mainly predatory or carnivorous, as their front legs are more or less raptorial in structure, the femora being usually swollen and armed beneath with teeth. The principal literature treating of our eastern forms is by: Say, 1832; Stal, 1872, 1874; Distant, 1882; Van Duzee, 1909, 1909a, 1910; McAtee, 1914; Barber, 1917, 1918, 1918a, 1918b, 1921, 1921a, 1923.

In his "Synoptic Keys to the Lygæidæ of the United States," Barber (1917, 1918), following Stal, has separated the Lygæidæ into eight subfamilies, seven of which are represented in the eastern states. These are separated by a modification of his keys, the structural characters used being mostly shown in figures 69 and 70.

KEY TO EASTERN SUBFAMILIES OF LYGÆIDÆ.

- a. All sutures between the ventral segments of abdomen straight and reaching the lateral margins on each side; head usually without setæ near the eyes.
- b. Front femora, as compared with the others, not much swollen, rarely armed beneath with teeth or spines; hind margin of pronotum, or at least that portion of it in front of scutellum, turned down convexly; all of the abdominal spiracles located on the dorsum or upper surface.
- c. Elytra, and often the entire upper surface, impunctate; hind margin of pronotum between scutellum and lateral angles more or less impressed or depressed; membrane with two inner veins usually united near base by a transverse vein.

Subfamily I. LYGÆINÆ, p. 339.

cc. Elytra and upper surface, except the membrane, more or less distinctly punctate; hind margin of pronotum between scutellum and lateral angles not impressed or depressed; inner veins of membrane not connected by a cross vein.

Subfamily II. CYMINÆ, p. 356.

bb. Front femora, as compared with the others, more or less shortened and swollen, armed or unarmed; hind margin of pronotum in front of scutellum not turned down convexly; ventral surface of abdomen, at least the sixth segment, with spiracles.

d. All the abdominal spiracles

not placed ventrally, at most only the three apical segments with them; front femora usually only moderately swollen and commonly unarmed; rarely (*Ischnodemus*) much swollen and armed.

e. Elytra not convex, almost if not wholly impunctate; head always narrower than hind margin of pronotum; tylus not sulcate; clavus not narrowing toward apex, the commissure distinct, at least half as long as scutellum.

Subfamily III.

BLISSINÆ, p. 363.

ee. Elytra convex and plainly punctate; head across eyes as wide or wider than hind margin of pronotum (fig. 80); tylus usually sulcate; clavus narrowing toward apex, the commissure absent or very short. Subfamily IV.

GECORINÆ, p. 372.

dd. All the abdominal spiracles placed on the ventral surface; front femora more or less swollen and always armed beneath (fig. 69).

f. Front femora strongly swollen, armed beneath with numerous teeth; corium not extending over sides of abdomen, its outer vein not parallel with costal margin; hind coxæ not widely separated; bucculæ short, confined to front of head.

Subfamily V. PACHYGRONTHINÆ, p. 379.

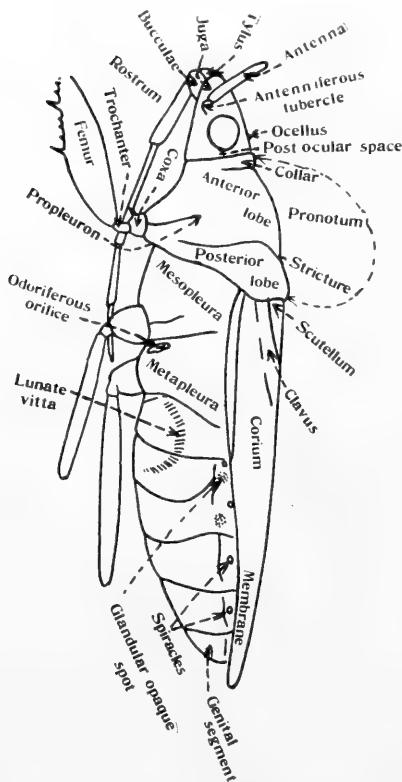


Fig. 70. *Ligyrocoris diffusus* (Uhler); lateral view illustrating Lygæid structures. Greatly enlarged. (After Barber in Hemiptera of Connecticut).

- ff.* Front femora less swollen, armed beneath with a single tooth; corium expanded, extended over sides of abdomen, its outer vein subparallel with its margin; hind coxæ widely separated; bucculæ extended to base of head.

Subfamily VI. OXYCARENINÆ, p. 383.

- aa.* Suture between the third and fourth ventrals (except in *Plinthisus* and *Gastrodes*) curved forward, not reaching the lateral margins (fig. 70); head usually with two setæ near eyes; fore femora swollen and usually armed with teeth.

Subfamily VII. RHYPAROCHROMINÆ, p. 384.

Subfamily I. LYGÆINÆ Stal, 1862a, 210.

To this subfamily, as characterized in the key, belong the largest of our Lygæids as well as some of moderate size. The impunctate elytra, impressed sides of base of pronotum, slender and usually unarmed fore femora and connected inner veins of membrane serve well to distinguish them. In the tribe *Orsillini* the females have ventrals 4—6 carinate, compressed and apparently divided at middle, their apical halves triangular, placed obliquely, with apices overlapping and converging towards middle of third ventral, which is convex. The subfamily is represented in the United States by six genera, five of which occur in our territory.

KEY TO EASTERN GENERA OF SUBFAMILY LYGÆINÆ.

- a.* Apical margin of corium straight, not sinuate inwardly; inner wings wholly or in great part fuscous or infuscated; outer apical angles of antenniferous tubercles obtuse; male with last dorsal segment truncate and genital segment not foveate; color usually black and red. (Tribe *Lygæini* Stal).
- b.* Pronotum with base sinuate and disk with a nearly entire median carina; scutellum convex, carinate toward apex.
- I. ONCOPELTUS, p. 340.
- bb.* Pronotum with base truncate and disk without a median carina or with carina not reaching front margin; scutellum flat but with a more or less evident longitudinal carina usually joined to a transverse basal one.
- II. LYGÆUS, p. 341.
- aa.* Apical margin of corium sinuate near clavus; inner wings subhyaline, not infuscated; outer apical angles of antenniferous tubercles acute or subacute; male with last dorsal rounded and genital foveate; color not black and red. (Tribe *Orsillini* Stal).
- c.* Basal segment of antennæ equalling or surpassing tip of tylus; beak not surpassing first ventral; head of moderate length.
- d.* Costal margin of elytra straight throughout; eyes prominent, the exposed area back of them greater than half their width; osteolar duct ending in an external ear-like expansion.
- III. ORTHOLOMUS, p. 348.

- dd. Costal margin straight only at base if at all; eyes less prominent; osteolar opening without expansion. IV. NYSIUS, p. 350.
 cc. Basal segment of antennæ not reaching apex of tylus; beak reaching or surpassing third ventral; head very long. V. BELONCHILUS, p. 355.

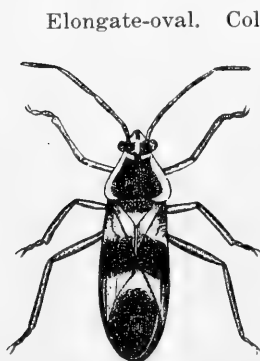
I. ONCOPELTUS Stal, 1868, 70.

Large or medium sized, elongate-oval, impunctate, black and red species having the head short, broad, inserted to eyes, the latter widely separated; tylus reaching or slightly surpassing middle of first antennal; ocelli widely separated; beak reaching first ventral; antennæ slender, longer than head and pronotum, second and fourth joints subequal, third shorter; pronotum subtrapezoidal, narrowed in front, median carina entire; scutellum triangular, apex acute, transversely impressed at base; elytra covering the abdomen and surpassing its tip; osteolar canal narrow, curved, margins thickened, rounded at tip. About 20 species are known, six from the United States, two of which occur in our territory.

KEY TO EASTERN SPECIES OF ONCOPELTUS.

- a. Head and side margins of pronotum not pilose, the latter thickened, reflexed, wholly pale; larger, 13 or more mm. 273. FASCIATUS.
 aa. Head and side margins of pronotum pilose, the latter not thickened or reflexed and black behind middle; smaller, not over 12 mm. 274. SEX-MACULATUS.

273 (432). *ONCOPELTUS FASCIATUS* (Dallas), 1852, 538.



Elongate-oval. Color black and red; cheeks, side margins of pronotum, basal and apical thirds of elytra, apex of scutellum, coxæ and abdomen in great part, bright red, fading to dull reddish-yellow; remainder of body, legs and antennæ shining black; genital plates, some spots near middle of third and fourth ventrals, and front angles of each ventral at sides also black. Pronotum declivent in front, deeply and narrowly impressed each side at apical third, the median carina low but evident throughout. Male with genital plate short, convex scarcely protruding beyond sixth ventral. Length, 13—18 mm. (Fig. 71).

Fig. 71, X 2. (After Uhler). (Fig. 71).

Occurs throughout Indiana, May 25—Oct. 9; frequent locally on foliage and pods of the common milkweed, *Asclepias syriaca* L., adults in May and June, all stages in September and October; also on foliage of willow and flowers of goldenrod and

other Compositæ in the latter months. Dunedin and Live Oak, Fla., Jan. 10—April 8; Orizaba, Mexico, July (*W. S. B.*). About Dunedin it occurs in company with the showy Coreid, *Scaphina grayi* Van D., and a small gray beetle, *Monædus guttatus* Lec., on a very slender-stemmed climbing milkweed, *Mctastelma scoparium* Nutt. This plant grows only in dense wet hammocks where it forms great masses on the shrubby undergrowth. By beating these masses in March and April one is pretty certain of getting all three of these insects, they being the only ones commonly found on the plant. The known range of *O. fasciatus* is a very wide one, extending from Massachusetts westward over the greater part of the United States east of the Rocky Mountains and south and southwest to Florida, Texas, California, Mexico and Brazil. It has been recorded from numerous stations in Florida and doubtless occurs throughout that State. The hosts of *O. fasciatus*, as well as that of several species of *Lygæus*, are different species of milkweed, and it is very doubtful if the young prey upon the plants of any other family.

274 (433). *ONCOPELTUS SEX-MACULATUS* Stal, 1874, 102.

Elongate-oval. Black; front half of pronotum with a large subtriangular orange-yellow spot each side; elytra each with a large oblong spot at base and a second oblique one near apex of corium, dull red; prosternum, osteolar canal, spot on hind margin of mesopleura and sides of first four ventrals orange to dull yellow. Front portion of pronotum with a large, deep, irregular impression each side, this enclosing a narrow, curved, more deeply impressed line. Head sparsely pilose, side margins of pronotum and corium densely so. Other characters as in generic description and key. Length, 10—12 mm.

Moore Haven, Caxambus, Chokoloskee and Cape Sable, Fla., Feb. 23—April 5. Taken by sweeping along the mucky margins of lakes and beating in dense hammocks. A Mexican and Central American species recorded by Barber from Lake Worth and Miami, Fla. That part of Stal's description: "maculis obsoletis duabus oblongis ante medium capitis testaceis; macula membranæ albida," does not hold good of the Florida specimens, as they have the head and membrane wholly black.

II. *LYGÆUS* Fabricius 1794, 133.

Oblong or oblong-oval bicolored species of medium or small size having the head and antennæ much as in *Oncopeltus*; beak reaching to or beyond middle coxæ; pronotum subtrapezoidal, more or less punctate and transversely impressed near middle,

the hind portion usually with an evident median carina; scutellum triangular, depressed and with a longitudinal median carina, usually joined to a median or premedian transverse elevation; elytra covering abdomen and surpassing its tip, the corium impunctate, its apical margin straight. Stal (1874, 104) recognized 53 species, mostly from tropical America. Van Duzee (1917) catalogued 27 from America north of Mexico. Of these Barber (1921) in the latest revision of the genus, accepts 23, nine of which occur in the eastern states.

KEY TO EASTERN SPECIES OF LYGÆUS.

- a. Pronotum black with a transverse red band across the middle of its basal lobe; head with red spot or stripe on vertex; larger, 10—12 mm. (Subgenus *Lygæus* Stal).
- b. Clavus without a pale inner margin; ventral surface of abdomen in great part red with black spots.
- c. Membrane entirely black without pale margins or white spots; head with a Y-shaped red spot, the prongs of the Y extending downward between base of antennæ and eye. 275. TURCICUS.
- cc. Membrane with pale margins, with or without white spots on disk; clavus wholly black; red spot on head not Y-shaped. 276. KALMII.
- bb. Clavus with a pale inner margin; ventral surface wholly black. 277. FORMOSUS.
- aa. Pronotum without a median transverse red band on basal lobe; smaller, not over 10 mm.
- d. Osteolar duct pale; head with red or pale markings (often very small). (Subgenus *Ochrostomus* Stal).
- e. Front lobe of pronotum wholly black or with black discal marks; head with only a small pale spot on vertex.
- f. Membrane and corium margined with pale; pronotum with front margin pale, the disk with a T-shaped fuscous stripe each side. 278. LINEOLUS.
- ff. Membrane and corium without pale margins, the latter with only the apical angles red; pronotum with front margin dark; disk without T-shaped fuscous marks. 279. TRIPLIGATUS.
- ee. Front lobe of pronotum red, its front margin yellow; head reddish-yellow between eyes and tylus; margins of corium and apical carina of scutellum pale; hind lobe of pronotum with two large subquadrate dark spots. 280. MIMULUS.
- dd. Osteolar duct black; head wholly black.
- g. Upper surface not pubescent; membrane without a whitish discal spot; length more than 7 mm. (Subgenus *Melanocoryphus* Stal).
- h. Hind lobe of pronotum and entire corium, except hind margin, dull red; front margin of pronotum, clavus and hind margin of corium, pale yellow. 281. BICRUCIS.
- hh. Hind lobe of pronotum black, the carina and side margins yellow or reddish-yellow; costal margin of elytra and apical carina of scutellum dull yellow. 282. FACETUS.

gg. Upper surface with short prostrate grayish pubescence; membrane with a whitish discal spot; length, less than 5 mm. (Subgenus *Lygæospilus* Barber). 283. TRIPUNCTATUS.

275 (434). *LYGÆUS TURCICUS* Fabricius, 1803, 218.

Elongate-oblong. Black and red, almost impunctate; head with red as in key; pronotum with front lobe wholly black, hind one with a broad red band across middle, this widest on margins and at middle; corium red with an irregular black spot, reaching costal margin behind middle; clavus with basal half or more, except inner margin, red; scutellum and membrane wholly black; sterna, antennæ and legs black; abdomen red with two rows of black spots along middle and another at margin each side; sixth ventral and genital plates black. Beak reaching hind coxæ. Pronotum with side margins rounded, feebly converging from base to apex; disk almost flat, punctate across middle and near front margin; basal lobe with median carina subobsolete. Scutellum with transverse elevation in front of middle, this joined to an obtuse median carina. Length, 10—11.5 mm.

Putnam and Crawford counties, Ind., scarce; May 12—July 11. Taken while crawling along pathways on the slopes of wooded hills, beneath bark of poplar logs and on flowers of the staghorn sumac, *Rhus hirta* L. It probably occurs throughout Indiana, but is much less common than *kalmii*. The two eastern



Fig. 72, X 5. (After Drake, Tech. Publ. No. 16, N. Y. St. Coll. For.).

species, *turcicus* and *kalmii*, have been so confused in the past that it is difficult to give the range of either. The types of *turcicus* were from New York and it is known definitely from that State and Massachusetts, west to Missouri and Colorado, but is not recorded south of Washington, D. C., where Banks found it on Jersey-tea (*Ceanothus*). The record of its life history by Townsend (1887) as well as several of the other citations by Van Duzee (1917, 151), probably refer to *kalmii*.

276 (437). *LYGÆUS KALMII* Stal, 1874, 107.

Elongate-oblong. Color very similar to that of *turcicus*, the red spot on head oblong and confined to middle of vertex; clavus wholly black; membrane with a narrow white margin and often with two small spots on middle, a larger one on base and a short spur on side slightly in front of apex of corium, white; upper surface except membrane quite evenly but not densely covered with a very short grayish

pubescence, this scarcely evident in *turcius*. Other characters as in that species. Length, 10—12 mm. (Fig. 72).

Common throughout Indiana and to be found throughout the year. Hibernates both as nymph and imago beneath logs, mullein leaves and other cover in the vicinity of its most common food plant, *Asclepias syriaca* L. When it emerges from its hibernaculum it has often been noted running rapidly along pathways, especially those in sandy regions, and on several occasions I have taken it crawling across sidewalks near the center of Indianapolis. From late July to mid-October it may be found in all stages on the pods of milkweed, usually *A. syriaca*, but also on those of *A. tuberosa* and *verticillata* L. The distribution of *A. kalmii* is a wide one, extending from Nova Scotia and New England west across the Continent to the Pacific and south and southwest to Georgia, Texas and Mexico. A specimen in the Ashmead collection is labelled "Florida," but Barber (1914, 509) seems to doubt the correctness of the label.

Parshley (1919, 14; 1923a, 81) has separated the form occurring east of a north and south line running near the 97th meridian between Canada and Texas, giving to it the subspecific name *angustomarginatus*. He characterizes this eastern race as having the "membrane usually without discal spots, rarely with small ones; white margin extremely narrow or rarely absent (fig. 72); red band between corium and membrane almost or quite as wide as that between corium and clavus." Of the 19 Indiana specimens before me, two have the membrane devoid of spots, in eight it has distinct spots at middle, base and side as above described, while nine have the spots at side and base only. The white margin of membrane is very evident in all. He states that the two subspecies merge just east of the line stated, but according to these Indiana specimens intermediates occur in this State. One of the Indiana specimens, with four rather large white spots on membrane, was once identified for me by Uhler as *L. redivivus* Say,⁴⁹ while those with small spots or none he called *L. turcius* Fab. Van Duzee (1923a) points out the distinctions between *kalmii* and its nearest allies, and regards Parshley's name as a synonym of *kalmii*.

277 (439). *LYGÆUS FORMOSUS* Blanchard, 1840, 130.

Elongate-oval. Black; a small triangular spot on vertex, hind portion of basal lobe of pronotum (except two large quadrate spots) and

⁴⁹See Psyche, 1895, 270.

the costal and inner margins of corium dull red or reddish-yellow; hind margin of corium narrowly black, bordered within by red; clavus with a broad pale yellow inner margin, this extending to apex of commissure; membrane pale hyaline; legs, antennæ and under surface black, sterna very narrowly margined with yellow. Hind lobe of pronotum with side margins thickened, the median carina of disk fine but distinct, separating the usual black basal bar into two oblong spots. Other characters as in *turcicus*. Length, 10–10.5 mm.

Cape Sable and Miami, Fla., Feb. 23—March 11 (*H. S. B.*). One specimen taken at each place by sweeping along the borders of hammocks. A Mexican species first recorded from this country by Barber from specimens taken at Biscayne Bay and Miami, Fla., by Mrs. Slosson and W. T. Davis. Known in this country only from that State. As mentioned by Stål (1874, 108) the pale spot on vertex is very small, often subobsolete; the black spots near base of pronotum are slightly in front of the base, the latter being dull reddish-yellow, and he states that they are at times more or less confluent.

278 (446). *LYGÆUS LINEOLUS* Dallas, 1852, 549.

Elongate-oblong. Fuscous or dull black, finely pubescent; a minute spot on vertex, pronotum, except two T-shaped stripes, apical carina of scutellum and margins of corium and commissure, dull yellow or tinged with reddish; membrane fuscous, narrowly edged with white; prosternum reddish-yellow with a quadrate central black spot; bucculæ and coxæ dull yellow. Beak reaching behind coxæ. Pronotum wider at base than long, front lobe with an irregular very narrow impressed line each side and a row of small punctures near front margin; hind one with carina scarcely evident. Other characters as in key and generic description. Length, 4.3–6 mm.

Sanford, Moore Haven, R. P. Park, Ft. Myers, Sarasota and Dunedin, Fla., Nov. 8—April 10. Common about Dunedin, both on mainland and islands, hibernating in bunches of Spanish moss, in crevices of dead leaves of cabbage palmetto and beneath rubbish; in spring occurring on foliage of various shrubs and herbs, especially on flowers of thistle and on grasses in open pine woods. Recorded from numerous stations in Florida. Ranges from Virginia south and southwest to Texas and New Mexico. The upper surface is thickly clothed with a very short pubescence which causes it to appear subopaque. The spot on head is often subobsolete and the T-shaped stripes of pronotum are sometimes so widened as to almost cover the front lobe.

279 (447). *LYGÆUS TRIPLIGATUS* Barber, 1914, 510.

Elongate-oblong. Fuscous or dull brown, minutely pubescent; a very small spot on vertex, three large ones on basal lobe of pronotum and tip

of corium reddish-yellow; apical carina and tip of scutellum, apical half of fourth antennal, bucculæ, coxæ, base of femora and prosternum in part, dull yellow. Beak reaching hind coxæ; third joint of antennæ but little shorter than second. Pronotum slightly broader than long, almost impunctate, a transverse elevation at apical third with three ill-defined impressions just behind it; median carina very short. Scutellum with the transverse ridge and apical carina quite prominent. Other characters as in generic description. Length, 6—7 mm.

Cape Sable, R. P. Park, and Chokoloskee, Fla., Feb. 20—April 7 (*H. S. B.*). Taken by beating within or along the borders of dense hammocks; frequent at R. P. Park in April in clumps of dead air plants. Recorded by Barber from Lake Worth and Punta Gorda, Fla., and known only from the southern third of that State. The median pale spot of pronotum is triangular, its apex forward, and the costal edge of corium is slightly paler than disk.

280 (458). *LYGÆUS MIMULUS* Stal, 1874, 113.

Elongate-oblong. Dull brown, thickly clothed with a very short grayish-yellow pubescence; front of head between eyes and antennæ, front lobe of pronotum, except front margin, red; front margin of pronotum, margins and middle of its hind lobe, all margins of corium and carina of scutellum, pale yellow; prosternum yellow with reddish spot on each side; under side of head, coxæ, base of femora, knees, hind margin of ventrals and margin of abdomen, yellow. Beak reaching onto metasternum. Third and fourth joints of antennæ subequal, second longer. Pronotum as in *triplicata*, the discal impressions less evident. Genital lobe of male broader than long, convex. Length, 5.5—6.5 mm.

Sanford, Ft. Myers, R. P. Park, Sanibel Island and Dunedin, Fla., Nov. 19—April 7. (*H. S. B.*). Aberdeen, N. Car., May 25 (*Brimley*). Frequent about Dunedin in early spring on plants growing about the margins of ponds and lakes. At Ft. Myers several examples were taken while sifting debris from the bed of a dry wet-weather pond, while at R. P. Park all stages were abundant in April on heads and stems of thistles along swales, so that it is evidently partial to moist localities. Recorded from numerous places in the State. Ranges from Virginia to Florida and Texas in the coastwise states. As the osteolar duct is pale and the head in great part reddish-yellow, I have transferred this species to the subgenus *Ochrostomus*, it having more affinities in size and color with *lincola* and *triplicata* than with the larger species with which it was placed by Stal and Barber.

281 (452). *LYGÆUS BICRUCIS* Say, 1825, 322; II, 246.

Elongate-oval. Head, disk of front lobe of pronotum, scutellum, disk of membrane, antennæ, legs, genital segments and spots on all the pleura, black or fuscous; hind lobe of pronotum, disk of corium and ventral surface of abdomen dull red; front margin of pronotum, clavus except margins, hind margin of corium, very narrow edge of membrane, bucculæ and pleura in great part, pale yellow; elytra rather thickly covered with small pale oval whitish scales. Third and fourth joints of antennæ subequal, second one-third longer. Beak passing middle coxæ. Pronotum with front margin and side margins of hind lobe visibly reflexed; disk sparsely, finely and rather evenly punctate, median carina low, its apex on front lobe spear-shaped. Scutellum with transverse ridge and apical carina prominent. Length, 7.5–9 mm.

Lake, Marion, Martin, Dubois, Crawford, Perry and Posey counties, Ind., May 9—July 1. Borden Springs, Ala., Aug. 15. Ormond and Dunedin, Fla., March 17—April 7 (*W. S. B.*). Agricultural College, Miss. (*Wced*). In Indiana it occurs on herbage, usually in low moist places. About Ormond, Fla., it was common the last of March on flowers of *Senecio* and other plants. At Dunedin it is scarce in spring on flowers of a dwarf papaw and low huckleberry. Charlotte Harbor and Atlantic Beach are the only other recorded stations from Florida. The general range of *bicrucis* is southern, extending from New York west to northern Illinois, Kansas and Colorado, and south and southwest to Texas, California, Mexico, Venezuela and Brazil. In Illinois Hart found it common in August on the flowers of the pale Indian Plantain, *Mesadenia atriplicifolia* L. In both that State and Indiana it is more common in sandy localities than elsewhere.

282 (453). *LYGÆUS FACETUS* Say, 1832, 13; I, 328.

Oblong-oval. Dull black, glabrous; all the margins and median carina of pronotum, apical carina of scutellum, costal margin of corium, front margin of prosternum and usually the bucculæ, coxæ and margins of abdomen, dull yellow or reddish-yellow; membrane with a very narrow pale margin. First, third and fourth joints of antennæ subequal in length, second longer. Beak reaching metasternum. Pronotum much narrowed in front, disk punctate across the median impression and behind front margin; hind lobe with side margins much thickened, their edges rounded. Scutellum with basal transverse ridge and median carina prominent. Elytra of female scarcely passing tip of abdomen, distinctly longer, male. Length, 8–10 mm.

Kissimmee, Moore Haven, Sarasota and Dunedin, Fla., scarce, Jan. 12—June 5. Only a half dozen specimens have been taken during 10 years collecting. They were found beneath

logs or were beaten from bunches of Spanish moss; the June individual at porch light. Say's types were from Florida and Barber records it from five stations in the southern half of the State. Ranges from New Jersey southwestward in the coast-wise states to Texas, the western records given by Van Duzee applying to *L. lateralis* Dall. The description of *L. rubriger* Stal (1862, 309) from "Carolina" agrees in most respects with *facetus* and is doubtfully placed as a synonym by Barber.

283 (460½). *LYGÆUS TRIPUNCTATUS* (Dallas), 1852, 559.

Oblong-oval. Dark brown or fuscous, thickly clothed with short, subprostrate grayish hairs, the margins of pronotum and abdomen with longer erect ones. Pronotum with front margin and a small spot on hind angles and middle of base brownish-yellow; costal margin of corium tinged with reddish-brown; membrane fuscous with a vague median spot, and more distinct ones near tip of corium, whitish; antennæ and tibiæ reddish-brown, the femora darker; prosternum and tarsi in part dull yellow, side margins of ventral segments sometimes red or pale. Pronotum punctate at middle and behind front margin. Scutellum with transverse ridge rather low. Length, 3.5—4.5 mm.

Dunedin, Fla., Jan. 6. Taken from beneath a chunk on the site of an extinct wet-weather pond. Yaphank, Long Island, July 4 (*Davis*). Described from St. John's Bluff, Fla., and recorded (as *L. albulus* Dist.) by Barber from Crescent City and Newberry. Ranges from New England and New York to Florida, Texas, and New Mexico, and usually recorded as *L. albulus* Dist., the latter itself being, according to Barber (1921, 68), a synonym of *L. pusio* Stal.

III. *ORTHOLOMUS* Stal, 1872b, 43.

Small, oblong or oblong-oval pubescent species having the head slightly longer than broad across the prominent eyes; antennæ slender, as long as head and pronotum united, basal joint reaching tip of tylus, third and fourth joints subequal, the latter stouter, fusiform, second slightly longer than either; pronotum coarsely punctate, hind lobe elevated, convex, longer and wider than front one; scutellum an equilateral triangle, apex obtuse, disk punctate, the carina distinct; elytra impunctate, reaching or slightly surpassing tip of abdomen; connexivum narrowly exposed. Female with ventrals 4—6 as described under subfamily heading. Four species are known from the United States, two of which occur in our territory.

KEY TO EASTERN SPECIES OF ORTHOLOMUS.

- a.* Head and pronotum a nearly uniform brown; median carina of scutellum wide, obtuse, prominent throughout; beak reaching onto second ventral; length, 5—6 mm. 284. *SCOLOPAX*.
- aa.* Head and pronotum dull yellow maculate with brown; median carina of scutellum narrow, much less prominent; beak reaching between hind coxæ; smaller, length, 4—5 mm. 285. *JAMAICENSIS*.

284 (462). *ORTHOLOMUS SCOLOPAX* (Say), 1832, 15; I, 330.

Elongate-oblong. Above dull grayish-brown, thinly clothed with short grayish pubescence; front edge, narrow transverse impression and apical angles of pronotum and basal half of each connexival, blackish; apex of corium reddish; membrane whitish-hyaline, both it and corium with vague fuscous markings; median carina of scutellum and apical angles of each connexival dull yellow; beneath dull reddish-brown, thickly clothed with prostrate grayish pubescence; sides of abdomen, pleura and femora with fuscous spots; coxæ, trochanters and middle of tibiæ dull yellow; antennæ reddish-brown, the first and fourth joints in part darker. Structural characters as under generic heading. Length, 5—6 mm.

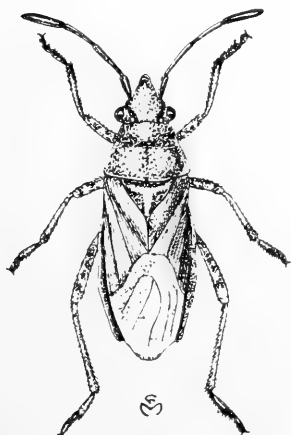


Fig. 73, X 7. (Original).

Frequent in the southern half of Indiana; Lake County only in the north; June 30—Oct. 6. Taken by sweeping weeds, flowers of goldenrod and other *Compositæ* growing on dry upland soil.

Sherborn, Mass., Sept. 20 (*Frost*). Baker's *O. uhleri*, described from N. W. Wisconsin (1906, 139), is separated by him only by having the "transverse line of pronotum reduced to a shining black fovea midway on either side of pronotum; length of head equal to width across eyes." These characters appear in numerous females of *scolopax* from Indiana and I regard his name as only a synonym.

Stal (1874, 122) evidently did not know Say's species, as he placed it doubtfully without remarks in *Belonochilus*. Barber (*Ms.*) states that in his opinion Stal's *Nysius* (*Ortholomus*) *longiceps* is a synonym of Say's *scolopax*. Stal's types of *longiceps* were from several of our northern states, and the description is brief and mainly a comparison with his *N. spurcus* from Taiti Island. There is nothing in the description to preclude its being Say's species, and as but the one form is known from the north I have adopted Barber's conclusions and combined the two. The known

range of *scolopax* (including the records of *longiceps*) extends from Quebec and New England west to Wisconsin and Kansas and south and southwest to Florida, Texas and California. The only Florida record is that of Barber from Biscayne Bay. Uhler (1876, 305) states that he found it common in August on dry grasses and sedges near Portland, Me., and in stubble fields in Maryland. The pronotum is sometimes in great part fuscous, while the pale median carina of scutellum is wider and much more prominent than in the next. The beak extends only slightly back of hind coxæ, not to middle of venter, as stated by Say.

285 (—). *ORTHOLOMUS JAMAICENSIS* (Dallas), 1852, 555.

Narrowly elongate-oblong. Above dull yellow with brown or fuscous markings; head with a curved blackish spot surrounding each ocellus, the two separated by a narrow yellowish line; pronotum with numerous brownish punctures, the narrow transverse impression and knobs of hind angles blackish; scutellum blackish at base; corium hyaline with small oblong fuscous marks on veins and costal margin, the apex reddish; membrane whitish with brown blotches; antennæ pale brown, the fourth joint darker; under surface and femora dull yellow mottled with brown; middle of meso- and metasterna black, shining, impunctate; tibiæ and tarsi dull yellow. Structural characters as above. Length, 4—5 mm.

Key West, Fla., March 1. Several specimens taken by sweeping herbage between the tide-water lagoons. A West Indian species not before recorded from the United States. Barber states (Ms.) that he regards the *providus* of Uhler (1894a, 182) as a synonym. Although Van Duzee (1907, 16) had expressed the same opinion, he later (1917, 157) makes both *providus* and *jamaicensis* synonyms of *longiceps* Stal.

IV. *NYSIUS* Dallas, 1852, 551.

Small oblong finely pubescent species, having the head slightly shorter than wide across the eyes; antennæ as in *Ortholomus*, the fourth joint less robust; beak reaching hind coxæ; pronotum trapezoidal, punctate, moderately declivent, front lobe less than one-half the length of hind one, the latter less convex than in *Ortholomus*; scutellum as there, the transverse ridge less prominent; elytra covering the abdomen and passing its tip; connexivum not exposed; costal margin of corium straight on basal fourth, then usually visibly expanded and slightly curved to apex; margins of osteolar duct not expanded at tip. Female ventrals as in *Ortholomus*. This genus is very close to *Ortholomus*, the *N. californicus* Stal serving as a connect-

ing link between the two, as in it the costal margin of corium, except at extreme base, is almost as straight as in *O. scolopax*. The head, however, is shorter and apex of osteolar duct not auriculate. Seven species of *Nysius* are recognized by Van Duzee from North America, six of which are known from our territory.

KEY TO EASTERN SPECIES OF NYSIUS.

- a.* Bucculæ abbreviated, distinctly narrowed and evanescent behind, scarcely reaching back of middle of eyes, the first joint of beak extending much beyond them; costal margins of corium straight at base for a distance less than half the length of scutellum, then suddenly narrowly expanded and straight and parallel to apex.
 - b.* First joint of antennæ distinctly surpassing tip of tylus; pronotum without a raised calloused space each side of middle. 286. CALIFORNICUS.
 - bb.* First antennal scarcely reaching tip of tylus; pronotum with a short elevated calloused line each side of middle. 287. BASALIS.
 - aa.* Bucculæ almost or quite reaching base of head, low but distinct throughout, first joint of beak not or but slightly extending behind them; costal margins of corium straight along the basal fourth or third, thence gradually expanded and visibly curved to apex.
 - c.* Basal joint of beak not extending behind the bucculæ; disks of corium and clavus but little infuscate.
 - d.* Basal joint of antennæ distinctly surpassing tip of tylus; eyes very prominent, width of head across them equal to that of hind margin of pronotum; color pale gray, pronotum with only the transverse impression of front lobe fuscous. 288. THYMI.
 - dd.* Basal joint of antennæ scarcely passing tip of tylus; eyes less prominent, width across them less than that of hind margin of pronotum.
 - e.* Color above dark gray, the pronotum and scutellum with numerous fuscous blotches; nervures and hind margin of corium in part fuscous; form rather robust. 289. ERICÆ.
 - ee.* Color above pale dull yellow with two vague fuscous stripes on head and four on pronotum; corium without spots, except a minute one at extreme tip; form slender, subparallel. 290. STRIGOSUS.
 - cc.* Basal joint of beak extending slightly behind the bucculæ; disks of corium and clavus clouded with fuscous. 291. GRÆNLANDICA.
286. (466). *NYSIUS CALIFORNICUS* Stal, 1859a, 242.

Elongate-oblong. Grayish-yellow, clothed with a minute glistening silvery-gray pubescence; head with a large fuscous spot surrounding each ocellus; pronotum often in great part fuscous, sometimes with only a narrow curved very irregular line across transverse impression and hind angles with a small spot, blackish; scutellum with base and punctures on

apical half usually blackish, apex of median carina pale; corium with small fuscous spots along the veins, the apical margin fuscous at middle and tip; membrane whitish-hyaline, usually with a few vague fuscous spots; antennæ with joints 2 and 3 pale brown, 1 and 4 in part or wholly fuscous; under surface and femora with numerous fuscous markings, the bucculæ, basal joint of beak, front margin of pronotum, sides of coxal cavities, osteola and basal parts of tibiæ and tarsi dull yellow. Pronotum with sides sinuate near middle, disk uneven, thickly punctate. Scutellum with transverse ridge ill defined, angulate, apical carina low, narrow. Other structural characters as in key and generic description. Length, 4.7—5.6 mm.

Lakeland, Moore Haven, Miami, R. P. Park, Ft. Myers and Dunedin, Fla., Nov. 19—April 2 (*W. S. B.*). Agricultural College, Miss. (*Wcd*). Very common about Dunedin and Moore Haven, and, according to the records, throughout Florida. Hibernates in bunches of Spanish moss, beneath loose bark of pine and under chunks along borders of ponds and lakes. Taken in numbers in March and April by sweeping foliage of *Compositæ* and other plants growing in mucky soil. Ranges from Connecticut and Maryland south and southwest to Texas and Mexico, and on the Pacific coast from Washington southward. Our eastern form was separated by Baker (1906, 135) as var. *alabamensis*. Larger and more parallel than our other species, from all of which except *basalis* it is easily separated by the form and length of bucculæ.

287 (467). *NYSIUS BASALIS* Dallas, 1852, 553.

Oblong-oval. Dull yellow, mottled with fuscous, rather thickly clothed with fine grayish-yellow prostrate pubescence; head except median line, front lobe of pronotum and base of scutellum, in great part, usually blackish, some vague blotches on corium and its apical margin in part fuscous; membrane clear hyaline, sometimes with fuscous lines or spots; connexivals fuscous, their incisures paler; basal joint of antennæ, in part, and apical joint usually wholly, brown to fuscous-black; under surface dull yellow, the sides of sterna black; abdomen with a line each side of middle and some spots near side margins black; femora dotted with brown or blackish; base of tibiæ and tarsi more or less fuscous. Third and fourth joints of antennæ subequal, the second longer than either. Pronotum trapezoidal, sides straight, evenly converging from base to apex; disk finely, unevenly, rather sparsely punctate. Scutellum with transverse ridge and apical carina often subobsolete. Connexivum narrowly exposed, female, wholly concealed, male. Membrane long, rather narrow, distinctly surpassing abdomen. Genital plate of male with a small round fovea. Length, 3.5—4.5 mm.

South Jacksonville, Fla., Sept. 7 (*Davis*). Guadalajara, Mexico, September; La Romano, San Domingo, July (*Barber*).

A neotropical species described from Jamaica and Brazil by Dallas and again by Uhler (1894, 183) from Grenada, Florida and Cuba as *N. inequalis*, a synonym. The Jacksonville specimen, the only one with definite Florida station, is much paler than those from Mexico and San Domingo, with median carina of scutellum more distinct.

288 (468). *NYSIUS THYMI* (Wolff), 1804, 149.

Oblong-oval. Pale grayish-yellow, silvery-pubescent; head with scattered punctures and a vague spot each side of vertex, fuscous; front margin and a narrow line across transverse impression of pronotum, median carina of scutellum, some small scattered spots on veins of corium and its hind margin in part, fuscous or blackish; under surface with pleura and first two ventrals in great part fuscous; femora and sides of abdomen with dark spots; antennæ pale brown, the first and fourth joints slightly darker. Apical two-thirds of costal margin rather strongly widened and reflexed. Other characters as in key. Length, 3.8—4.7 mm.

Indian Lake, Sabael, N. Y., Aug. 13—17 (*Barber*). An introduced European species of northern distribution, its known range in this country extending from Quebec and New England west and north to Vernon, B. C., and Alaska. It was formerly much confused with *N. ericæ* and some of its more southern records belong to that species.



Fig. 74, X 10. (After Forbes).

289 (470). *NYSIUS ERICÆ* (Schilling), 1829, 86.

Oblong. Dark gray or fuscous, thinly, minutely pubescent; head, pronotum and scutellum with the punctures usually in great part fuscous, those on pronotum often forming narrow dark stripes; veins and hind margins of corium often in great part dark; membrane whitish-hyaline

sometimes vaguely clouded with fuscous; under surface mostly blackish; bucculæ, front margin of pronotum, sides of coxal cavities, osteolar duct, tibiæ and middle of female abdomen, dull yellow; femora thickly dotted with brown. Bucculæ low, gradually evanescent behind; not reaching base of head. Expansion of costal margin of corium more narrow than in *thymi*. Length, 3.2—4 mm. (Fig. 74).

Abundant everywhere in southern Indiana, less so in the northern counties, occurring throughout the year. Hibernates beneath boards, piles of weeds and other rubbish in or along the

margins of cultivated fields. In spring and summer taken by sweeping weeds and grasses in meadows and waste places, all stages having been found in Marion County as early as May 5. In Florida it is very scarce, but has been taken by me at Dunedin, Sanford and Caxambus and is recorded by Barber from Miami. Ranges from Ontario and New England west to Dakota, Colorado and British Columbia, and south and west to Florida, Texas and California. The majority of the U. S. records have been made under the name of *N. angustatus* Uhler (1872, 406), a synonym. It often occurs in numbers sufficient to cause much damage to field and garden crops. Riley (1873, 113) described it as *N. destructor* and gave it the common name "false chinch-bug" by which it is usually known in the central west. He recorded it as injurious to potatoes, turnips, beets, radishes and cabbages; also to strawberry and grape vines. In some specimens the black of head and pronotum so predominates that the paler parts are scarcely visible, while in others, especially the females, the hind lobe of pronotum is almost wholly pale. Stal does not list the species in his *Enumeratio* but mentions it under *N. granlandicus*. Milliken & Wadley (1922) state that in Kansas *N. ericeæ* is extensively preyed upon by a closely allied Lygæid, *Geocoris pallens decoratus* Uhl. Parshley (1919, 15) records the appearance of *ericeæ* near Vernon, B. C., in "great numbers, swarming over the trails and entering houses. For a few days the walls of the houses, inside and out, were covered with the insects, and complaints were made that they bit children—altogether a most unusual occurrence." 290 (472). NYSIUS STRIGOSUS Uhler, 1894, 238.

Elongate, slender, subparallel. Color above a nearly uniform pale brownish-yellow; two short stripes on occiput, four vague ones on pronotum, extreme base of scutellum and a small spot on tip of corium, fuscous; under surface dull yellow, the middle of all the sterna and the first two ventrals blackish; antennæ reddish-brown, the second joint darker; legs dull yellow, the femora with purplish-brown dots. Bucculæ and beak as in *ericeæ*. Head and pronotum closely and evenly punctate. Clavus and corium finely, thickly and shallowly punctate. Expansion of costal margin of corium rather strongly recurved, translucent. Length, 3—3.5 mm.

Miami, Fla., March 12; one specimen beaten from vegetation on the grounds of the U. S. Entomological Station. A species of western distribution, originally described from California. This is the first record from east of the Mississippi, but Barber (Ms.) says that he has seen it from Florida.

291 (469). *NYSIUS GRÆNLANDICUS* (Zetterstedt), 1838a, 262.

Form and size of *ericæ* to which it is very closely allied. Differs in having the general color darker, the clavus and corium in great part brown or fuscous, the apical margin of corium wholly so. Head longer and more pointed. Pronotum wider and less narrowed in front, its punctures fewer, much coarser, more unevenly placed. Length, 3.2—3.5 mm.

Nain, Labrador (*Barber*). "Greenland, Labrador, Hudson's Bay Terr., Alaska." (*Van D.*, 1917).

V. *BELONCHILUS* Uhler, 1871, 104.

Head very long, subequal in length to pronotum; tylus distinctly surpassing first antennal; eyes not in contact with front margin of pronotum; joints 3—4 of antennæ subequal in length, second slightly longer, fourth stouter, fusiform; beak reaching or surpassing fifth ventral; costal margin of corium straight, parallel; connexivum narrowly exposed; osteolar duct not auriculate at apex. Female with ventrals 3—6 as in other *Orsillini*. Two species are known, both occurring in the eastern states.

KEY TO SPECIES OF *BELONCHILUS*.

- a.* Front femora armed beneath at apical fourth with a small spine; pronotum with only a trace of a pale median line; male genital with a small tubercle. 292. *NUMENIUS*.
 - aa.* Front femora unarmed beneath; pronotum with entire pale median line; male genital foveate. 293. *KORESHANUS*.
- 292 (473). *BELONCHILUS NUMENIUS* (Say), 1832, 15; I, 331.

Elongate-oblong. Dull yellow; median line of head, smooth areas on hind lobe of pronotum, median carina of scutellum, costal margin of corium, coxæ, tibiæ and abdomen, in great part, pale yellow; apex of corium and middle of margin of each connexival, reddish; membrane with a vague reddish stripe at middle; femora dotted with brown; knobs over basal angles of pronotum, last joint of beak and sometimes a stripe on head and spot on middle of abdomen, blackish. Pronotum punctate, the transverse impression deep; front lobe half the length of hind one, the latter higher, convex. Scutellum with transverse keel narrow, angulate. Beak somewhat variable in length, often reaching genital plate. Length, 5.3—6 mm.

Marion, Knox and Posey counties, Ind., scarce; April 23—Oct. 12. The April specimen was taken beneath a fungus-covered log, so that it probably hibernates as adult; the others by sweeping shrubs along streams. Ranges from Massachusetts and New York west to Arizona and California. Not taken in the east south of Maryland. Van Duzee took it near Buffalo, N.

Y., in August on goldenrod, and Heidemann near Washington, D. C., on the ripened fruit-heads of the sycamore.

293 (474). *BELONCHILUS KORESHANUS* Van Duzee, 1909, 165.

Elongate, slender. Grayish-brown; head, pronotum, scutellum and under surface often reddish-brown or in part fuscous; fourth joint of antennæ dark brown, the others paler; bucculæ, median line of pronotum and apical half of median carina of scutellum, pale yellow; membrane whitish-hyaline often with vague dark brownish blotches and usually with a reddish one each side of base; tibiæ dull yellow, the base and apex darker. Tylus longer and more slender than in *numenius*. Ocelli much closer together, separated by slightly more than twice their diameters, in *numenius*, much closer to eyes and separated by four times their diameters. Median carina of scutellum narrower, less prominent. Other differences as in key. Length, 4.8—5 mm.

Sanford, Caxambus, R. P. Park, and Dunedin, Fla., Nov. 18—April 8. Taken in small numbers by beating water oak and dead vines and sweeping vegetation near water. The types of Van Duzee were from Ft. Myers and Estero, Fla., and at the latter place he “found them abundant on a low branching hirsute, labiate plant; locally called ‘pennyroyal.’ The flowers of this plant form compact heads something like those of the crimson clover, and among the bracts of these the insect occurred by hundreds in all stages of growth.” Barber records *koreshanus* from five Florida localities other than those mentioned. So far as known it occurs only in the southern half of that State.

Subfamily II. CYMINÆ Stal, 1862a, 211.

Small oval or elongate species differing from the *Lygæina* mainly in having the hind margin of pronotum each side of base of scutellum not depressed or impressed; corium with distinct punctures; membrane without a cross-vein near base. The front femora are not swollen or armed beneath; and none of the spiracles are visible on the ventral surface. The females resemble those of the tribe *Orsillini* in having the last three or four ventral segments compressed, overlapping and inclined forward. The subfamily comprises four North American genera, three of which are represented in the eastern states.

KEY TO EASTERN GENERA OF CYMINÆ.

- a. Corium in great part hyaline, with only a few punctures along its middle; fourth antennal subequal to or slightly longer than third; head without a curved longitudinal sulcus before each ocellus; scutellum equilateral (Tribe *Ischnorrhynchini* Stal).

- b.* Head but slightly declivent in front; eyes almost in contact with front margin of pronotum; width of head across eyes only about half that of hind margin of pronotum; form rather broadly oval.

I. ISCHNORRHYNCHUS, p. 357.

- bb.* Head strongly deflexed in front; eyes well separated from front margin of pronotum; width of head across eyes about that of hind margin of pronotum; form narrowly elongate.

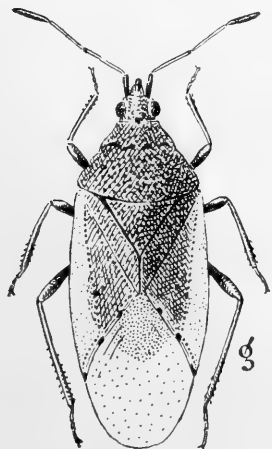
II. CYMONINUS, p. 359.

- aa.* Corium not hyaline, densely punctate throughout; fourth antennal shorter than third; head with a narrow curved longitudinal sulcus before each ocellus; scutellum wider at base than long (Tribe *Cymini* Stal).

III. CYMUS, p. 359.

I. ISCHNORRHYNCHUS Fieber, 1861, 51, 199.

Small oval species having the head subconical, slightly wider across the eyes than long; antenniferous tubercles short, obtuse; antennæ longer than head and pronotum, joints 2 and 3 slender, 4 stouter, fusiform, slightly longer than third; bucculæ short, scarcely reaching front margin of eyes; beak reaching second ventral; pronotum bell-shaped, constricted near apex; clavus with sides parallel, its commissure shorter than scutellum; elytra covering the abdomen, much surpassing its tip; margins of osteolar duct slightly prolonged, their tips subacute. Males with genital plate oval, convex. Other characters as in key. Van Duzee recognized five North American species, two from the eastern states. These are in my opinion synonyms, but one of his southwestern species occurs in Florida.



KEY TO EASTERN SPECIES OF ISCHNORRHYNCHUS.

- a.* Larger, length, 4—5 mm.; femora wholly pale. 294. RESEDÆ.
aa. Smaller, not over 3.2 mm.; femora dark brown or fuscous, knees paler. 295. CHAMPIONI.

294 (476). ISCHNORRHYNCHUS RESEDÆ (Panzer), 1797, x1.

Rather broadly oval. Above pale to dark reddish-brown; transverse impression of pronotum and often a triangular spot each side of vertex, blackish; corium yellowish-hyaline, its disk with two small dots at apical third and hind margin with three or four similar ones, blackish; scutellum blackish at base, reddish-brown toward apex; clavus in pale specimens yellowish; antennæ with joints 1 and 4 fuscous, 2 and 3 brown, darker at tip; under surface fuscous, the prosternum in part, margins of abdomen and genital plates

Fig. 75. X 10. (After Drake, Tech. Publ. No. 16, N. Y. St. Coll. For.).

paler; posterior apical angles of metapleura white; legs reddish-brown. Head and pronotum rather finely and thickly punctate; clavus with three rows of punctures; scutellum with transverse ridge and median carina very faint. Other characters as in generic description. Length, 4—5 mm. (Fig. 75).

Common throughout Indiana. Hibernates beneath cover along the edges of waste places and cultivated fields. Taken in spring and summer by sweeping. Near Indianapolis, on April 23, it was once swept by scores from the stems of dead asters of the previous year; while on Aug. 12 it was noted by hundreds in all stages, the adults mating, on a hedge row of *Spiraea van-houttei* Zabel. In Florida I have taken it in small numbers at Bassenger, Cape Sable and Dunedin by sweeping herbage in low moist grounds and also beneath loose bark of pine. These southern specimens differ from those from Indiana only in averaging slightly smaller and in the slightly more yellowish hue of the hyaline corium. Specimens named *resedæ* for me by Uhler, and others named *I. geminatus* (Say) by both Van Duzee and Barber, have been carefully compared with specimens of *resedæ* from England, sent me by Mr. China, and I can find no constant appreciable difference. The markings, punctuation and even the color of the antennal joints are the same in all. I therefore follow Stål (1874, 124) and Uhler (1861, 23) in making Say's name a synonym. The distribution of *I. resedæ* is in general northern. It is found in northern Europe and Siberia and in this country ranges from Quebec and New England west and north across the Continent, and south and southwest to Florida, Texas and California. In Maryland Uhler (1876, 305) found it "sparingly on bushes and shrubbery near the edges of woods." In Florida it has been previously recognized only from Jacksonville.

295 (480). *ISCHNORRHYNCHUS CHAMPIONI* Distant, 1882, 193.

Oval. Color much as in *resedæ*; antennæ with all the joints reddish-brown, darker only at tips; head and pronotum without black markings; scutellum with small spot at middle and apex blackish; entire elytra, except dark dots on corium, pale hyaline; legs darker, the femora fuscous, their apices paler; metapleura and osteolar duct wholly pale. Length, 3—3.2 mm.

Ft. Myers and Dunedin, Fla., Nov. 17—March 27. Taken in some numbers at Dunedin by sweeping herbage along a roadside ditch, and at Ft. Myers by sifting dried muck from the bed of an extinct pond. This is the first record from Florida, it

being a neotropical species hitherto known in the United States only from Texas and California.

II. CYMONINUS Breddin, 1907, 38.

Elongate, slender species having the head strongly deflexed between the antennæ, not inserted in thorax to eyes; clavus widened behind; corium hyaline, narrow, with a single median row of punctures, its costal margin concave toward base. Other characters as in key and under subfamily heading. One species is known.

296 (481). CYMONINUS NOTABILIS (Distant), 1882, 191.

Elongate, slender. Head, pronotum and scutellum dark reddish-brown, pubescent with scattered erect hairs; corium yellowish-hyaline, the extreme apex fuscous; clavus and commissure yellowish; membrane clear hyaline; sterna reddish-brown; legs dull yellow; abdomen pale greenish-yellow; tip of beak and last joint of tarsi fuscous; antennæ brownish-yellow, the apical joint slightly darker. Second joint of antennæ one-half longer than third, the latter slightly shorter than fourth. Beak reaching middle coxæ. Bucculæ short, evanescent behind, not reaching base of head. Pronotum densely punctate, constricted near apex, the basal lobe strongly convex. Length, 3—3.3 mm.

Common throughout southern Florida. About Dunedin it occurs in numbers from November to mid-April, both on islands and main land, hibernating beneath rubbish along the margins of ponds and in spring taken by sweeping herbage along roadside ditches and in low moist cultivated grounds. A neotropical species known in this country only from Florida. The head and pronotum are often marked with a median and two short stripes of whitish bloom.

III. CYMUS Hahn, 1831, 76.

Small oblong or elongate-oval species of a pale color having the head porrect, as wide or wider than long, inserted in pronotum almost or fully to eyes; cheeks shorter than tylus, their tips often acute; antennæ with basal joint stout, third longer than second, fourth shorter, fusiform; beak reaching middle coxæ; pronotum longer than wide, constricted near apex, coarsely, thickly and evenly punctate, basal portion convex; clavus widened behind, commissure much longer than scutellum; membrane relatively small, hyaline. Other characters as in key. Seven species are known from North America, six of them from the eastern states.

KEY TO EASTERN SPECIES OF CYMUS.

- a. Basal joint of antennæ not surpassing tip of tylus, less than half the length of second.
- b. Front portion of pronotum without a distinct median longitudinal smooth line; second antennal much shorter than third; head about as long as wide, first antennal not reaching its apex. 297. *ANGUSTATUS*.
- bb. Front of pronotum with a pale, elevated, smooth median line; second and third joints of antennæ subequal in length; head wider than long.
- c. Width of front margin of pronotum greater than that of space between eyes; fourth antennal distinctly shorter than third; larger, length, 4.5 or more mm.
- d. Pronotum but slightly wider at base than long, its sides evidently converging from base to apex, its disk finely, unevenly and shallowly punctate; color pale straw-yellow; form slender. 298. *LURIDUS*.
- dd. Pronotum about one-third wider at base than long, subquadrate, its sides very slightly if at all converging toward apex and disk coarsely, evenly and deeply punctate; color pale to dark reddish-brown; form more robust. 299. *ROBUSTUS*.
- cc. Width of front margin of pronotum subequal to that of space between eyes; fourth antennal scarcely shorter than third; smaller, not over 3.7 mm. 300. *DISCORS*.
- aa. Basal joint of antennæ distinctly surpassing tip of tylus, usually half or more than half the length of second; front portion of pronotum with a pale smooth elevated line. 301. *BELLUS*.
- e. Head and basal antennal in great part black; third antennal one-half or more longer than second; length less than 3.5 mm. 302. *VIRESCENS*.
- ee. Head and basal antennal wholly pale; third antennal more than twice the length of second; length, 4—4.5 mm.

297 (484). *CYMUS ANGUSTATUS* Stal, 1874, 126.

Elongate-oval.

Above pale brownish-yellow; head, pronotum and scutellum somewhat darker, often clouded with fuscous; extreme tips of clavus and corium, and fourth antennal except base, piceous or fuscous; beneath reddish-brown, the legs paler. Pronotum subcylindrical, its basal portion strongly convex, side margins obtuse or broadly rounded, front margin as wide as space between eyes. Other characters as in key. Length, 3.8—4.2 mm. (Fig. 76).

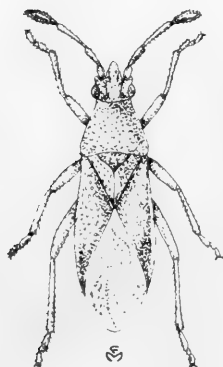


Fig. 76, X 10.
(Original).

Common in northern Indiana, less so in the southern counties; occurs throughout the year. Hibernates beneath logs and other cover and in spring and summer taken by sweeping vegetation growing in moist or alluvial soil along lakes and streams, or the borders of woodland. Sherborn, Mass.,

Oct. 18 (*Frost*). Ranges from Ontario and New England west to Kansas and Colorado and southwest to Florida and Texas. It is the most common of our northern species and feeds upon various species of *Carex* and *Juncus*. Taken at Lake Worth, Fla., by Mrs. Slosson.

298 (483). *CYMUS LURIDUS* Stal, 1874, 126.

Elongate-oval. Pale straw-yellow, often slightly tinged with reddish-brown; pronotum with front margin and a stripe each side, often fuscous; elytra sometimes marked with vague fuscous blotches; tips of corium and clavus, apical half of fourth antennal, meso- and metasterna and tips of tarsi, often tinged with fuscous. Basal joint of antennæ scarcely reaching apex of head. Pronotum subtrapezoidal, not strongly convex behind, disk with an obvious pale obtuse carina in front of middle. Scutellum with a similar median carina. Length, 4.8—5 mm.

White Plains and Cascade Lake, Adirondack Mountains, N. Y., Sept. 29 (*Barber*). Not as yet taken but should occur in northern Indiana. The general range of *luridus* is northern, ranging from Ontario and Maine to Colorado, Vancouver and California. Stal's types were from New Jersey, and it has not been recorded south of that State.

299 (—). *CYMUS ROBUSTUS* Barber, 1924, 87.

Elongate-oval, more robust than *luridus*. Pale reddish-brown, or brownish-yellow; head beneath and sternum often tinged with fuscous; tip of fourth antennal and apex of corium fuscous; membrane hyaline, often faintly mottled with fuscous. Head relatively broader and more declivent than in *luridus*, antennæ shorter than there, the basal joint reaching or slightly surpassing apex of head. Pronotum as in key, the median carina less evident than in *luridus*. Clavus and corium more strongly punctate. Length, 4.5—4.7 mm.

Lake Co., Ind., May 30 (*H. S. B.*). Lake and Porter counties, Ind., May 31—July 9 (*Gerhard*). Occurs on marsh grasses and sedges, probably throughout the Transition Life Zone of the State. Described from New York and Michigan. Recorded by Barber (loc. cit.) as "feeding on flower and seed heads of a tall species of bulrush (*Juncus*)."

300 (485). *CYMUS DISCORS* Horvath, 1908, 559.

Oblong-oval. Pale brownish-yellow; pronotum and disk of corium often with vague brownish or fuscous markings; fourth antennal, tips of corium and clavus, and last joint of beak more or less fuscous. First antennal not reaching apex of head. Pronotum subquadrate, sides visibly sinuate near middle, hind portion of disk strongly convex; front portion and scutellum each with a distinct median carina. Length, 3.2—3.5 mm.

Starke, Marion and Dubois counties, Ind., May 6—Oct 5; probably occurs throughout the State. Taken in Marion County by hundreds and in all stages on the latter date on the heads of wool-grass *Scirpus cyperinus* (L.). Sherborn, Mass., Sept. 20 (Frost). Occurs on other species of *Scirpus* throughout its known range, which extends from Quebec and New England west to Indiana. Not recorded south of New Jersey.

301 (486). *CYMUS BELLUS* Van Duzee, 1909, 167.

Oblong-oval. Pale to dark brownish-yellow; head, basal three-fourths of first antennal and often elevated hind portion of pronotum black; extreme tip of clavus and very narrow hind margin of corium fuscous; membrane whitish-hyaline, often with a vague median fuscous stripe; front edge of pronotum and apical fourth of first antennal white; second and third antennals pale brown, fourth fuscous; under surface reddish-brown, legs paler, claws black. Tylus strongly deflexed. First antennal stout, as broad as tylus, surpassing the latter by half its length. Pronotum subcampanulate, disk coarsely and regularly punctate, its hind portion strongly convex; front one with a short pale carina. Scutellum finely carinate. Length, 3—3.2 mm. (Fig. 77).



Fig. 77, X 10.
(After Van Duzee).

Dunedin and Moore Haven, Fla., Nov. 14—April 9. Taken by sweeping about the margins of ponds. Described from Sevenoaks (near Clearwater), Fla., and recorded only from there and Jacksonville, not known outside that State. Van Duzee's types were "swept from a fine grass or more probably a *Juncus* growing on one of the dry open depressions (wet weather ponds) that are common in the interminable pine-barrens of Florida."

302 (487). *CYMUS VIRESCENS* (Fabricius), 1794, 70.

Elongate-oval. Pale straw-yellow; extreme tips of clavus and corium piceous; first and fourth antennals brownish; tip of beak and claws blackish. Basal joint of antennæ very stout, exceeding tylus by half its length. Antenniferous spines and cheeks acute, prominent. Pronotum subtrapezoidal, its hind portion not strongly elevated, front margin almost as wide as head across the eyes; disk with carina evident, but narrow. Scutellum with carina more distinct. Length, 4—4.5 mm.

Crawford Co., Ind., Aug. 30; swept from herbage along the bank of the Ohio River. Pahoka, Canal Point, R. P. Park and Istokpoga, Fla., March 25—April 2. Taken by sweeping sedges and grasses along the margins of Lake Okeechobee and along the side of a cypress swamp near Istokpoga, Recorded as *C.*

breviceps Stal, a synonym, from five other stations in Florida. The types of Fabricius were from "Insulæ Americæ meridionalis," while those of Stal's *breviceps* were from Carolina and Texas. It ranges from New Jersey southward in the coastwise states to Mexico and Porto Rico, but is known from the eastern inland states only from Indiana. Recorded also by Pennington from Argentina and by Uhler as *breviceps* from Colorado, Utah and California. In the form of body, and especially the pronotum, *virescens* is more closely allied to *luridus* than to any of our other species. The *Cymodema exiguum* Horv. (1908, 559) is also a synonym of *virescens*.

Subfamily III. BLISSINÆ Stal, 1862a, 210.

Small elongate or oval species having the head broader across the eyes than long, but narrower than hind margin of pronotum; pronotum usually not sufficiently constricted or impressed to form two lobes, punctured, without carina; elytra often dimorphic in length, impunctate; clavus not narrowing behind, the commissure at least half the length of scutellum; front femora thickened, unarmed beneath. Females with ventrals 5—6 narrowed, overlapping and converging forward. Other characters as in subfamily key. Two genera are recognized, both represented in the eastern states.

KEY TO EASTERN GENERA OF BLISSINÆ.

- a. Body elongate, abdomen over twice the length of head and thorax united; beak not surpassing middle coxæ; scutellum equilateral; hind margin of corium straight. I. ISCHNODEMUS, p. 363.
- aa. Body short, oblong-oval, abdomen less than twice as long as head and thorax united; beak surpassing middle coxæ; scutellum wider at base than long; hind margin of corium sinuate before apex of clavus. II. BLISSUS, p. 369.

I. ISCHNODEMUS Fieber, 1836, 337.

Slender-bodied Lygæids having the antennæ slightly longer than head and pronotum united, first joint, short, stout, passing apex of head, fourth fusiform; pronotum usually with a more or less evident transverse impression; abdomen concave above, enclosing the elytra, the latter usually reaching its apex, macropterous form, often scarcely longer than pronotum, brachypterous form; front coxal cavities closed behind along the hind margin of prosternum. The genus is a large one, Stal (1874, 130) recognizing 21 species, mostly from the tropical regions. A number have been since described and seven species

are recognized by Van Duzee from North America, five of which occur in our territory, while four others are herewith included.

KEY TO EASTERN SPECIES OF ISCHNODEMUS.

- a. Beak not or very slightly passing base of prosternum.
- b. Membrane wholly pale with fuscous veins; elytra without a broad black bar across basal third.
- c. Pronotum not or very feebly constricted at basal third and without a distinct median groove; antennæ slender, the basal joint distinctly longer than thick; abdomen blackish.
- d. Third antennal scarcely shorter than second; discal area of corium with one or two fuscous veins; second interior vein of membrane but feebly curved inward at its basal third.
- e. Antennæ wholly black; basal lobe of pronotum not punctate. 303. FALICUS.
- ee. Basal half or more of antennæ reddish-brown; basal lobe of pronotum punctate. 304. INTERMEDIUS.
- dd. Third antennal distinctly shorter than second; discal area of corium wholly pale; second interior vein of membrane sharply angularly bent inward at its basal third almost to first vein. 305. RUFIPES.
- cc. Pronotum distinctly and widely constricted at basal third, its front portion with a broad shallow median longitudinal groove; antennæ stout, the basal joint oval, nearly as thick as long; abdomen pale reddish-brown. 306. ROBUSTUS.
- bb. Membrane with apical two-thirds shining black; elytra with a broad black bar across basal third. 307. ATRAMEDIOUS.
- aa. Beak reaching to or behind the middle of mesosternum.
- f. Basal half or more of antennæ pale; head and front portion of pronotum black; osteolar duct blackish or obscurely pale.
- g. Pronotum without a black velvety bar across the base and with at least the basal margin pale; antennæ with two apical joints wholly or in part dark; elytra in brachypterous form with dark veins; length 5 or more mm.
- h. Pronotum with basal fifth or less pale; antennæ stout, basal joint slightly longer than thick; color black, legs dark reddish-brown. 308. LOBATUS.
- hh. Pronotum with basal fourth or more pale; antennæ more slender, basal joint much longer than thick; legs pale reddish-brown. 309. SLOSSONI.
- gg. Pronotum wholly blackish and with a black velvety bar across the base; antennæ with only the apical joint dark; elytra, brachypterous form, small white pads without dark veins, but with an oblique black spot behind middle; length less than 3.5 mm. 310. MINUTUS.
- ff. Antennæ wholly blackish; head and pronotum dark brown or paler; osteolar duct pale. 311. BADIUS.

303 (489). *ISCHNODEMUS FALICUS* (Say), 1832, 15; I, 331.

Elongate-slender. Head, pronotum, scutellum and under surface black thickly pubescent; abdomen fuscous, its margins paler; basal fifth of pronotum and legs reddish-brown; corium and membrane whitish with veins fuscous. Pronotum subquadrate, depressed above, sides rounded in front; pale portion of base slightly prolonged at sides, sloping downward to a very thin edge. Scutellum carinate on apical half. Elytra in macropterous forms reaching sixth dorsal. Female with oblique hind margin of fifth ventral ending under hind margin of fourth before reaching median line. Length, 4.2—5.3 mm.

Lake and Marion counties, Ind., scarce, May 29—June 8. Wolf Lake, Ill., July 19. Taken by sweeping grasses and sedges along the margins of ponds and lakes. Ranges from Massachusetts and Connecticut west to Dakota and southwest to Texas. Uhler (1876, 305) says that in Maryland "it passes the winter beneath stones in sheltered places and may be swept from plants in damp situations in June and July." In New Jersey Smith found it common on cranberry bogs in June.

304 (—). *ISCHNODEMUS INTERMEDIUS* Barber, Ms.

Allied to *falicus* but smaller, and more slender. Color much as there; antennæ with joints 1, 2 and basal half of 3 reddish-brown, apical half of 3 fuscous, 4 shining black. Beak reaching base of prosternum. Pronotum shorter than in *falicus* with sides more rounded in front; disk of front lobe more convex, of hind one coarsely punctate in front of the smooth pale area. Elytra in brachypterous forms reaching third dorsal. Scutellum much smaller than in *falicus*, impunctate and without carina. Length, 4.8 mm.

Spencer Co., Ind., May 25; swept from roadside herbage (*W. S. B.*). Speeceville, Pa. (*Barber*). No other records.

305 (490). *ISCHNODEMUS RUFIPES* Van Duzee, 1909, 167.

Elongate-slender. Black, opaque, thickly clothed with a very fine silvery gray pubescence; hind border of pronotum and sides of abdomen and clavus brownish; legs pale brownish-yellow; corium and membrane white, their veins tinged with brownish-yellow or fuscous, the membrane usually with a small fuscous spot adjacent to the blackish apex of corium; antennæ dark reddish-brown, the apical joint piceous with pale tip. Second and fourth antennals subequal in length; first short, stout, slightly passing apex of head. Beak reaching base of prosternum. Pronotum much as in *falicus*; disk finely punctate and with a vague, median transverse impression, opposite which the side margins are feebly sinuate. Scutellum with base very feebly elevated, median carina scarcely evident. Elytra, macropterous form, reaching middle of sixth dorsal; brachypterous form, the base of second dorsal. Female with oblique hind margin of fifth ventral reaching median line of abdomen. Length, 5—5.2 mm.

Ft. Myers, R. P. Park, Moore Haven, Istokpoga and Dunedin, Fla., Nov. 19—April 4. Frequent about Dunedin in moist localities; hibernating beneath cover and in spring taken by sweeping dead sugar cane, grasses and other vegetation. As yet taken only in Florida, where it is known from Ormond south to R. P. Park and Estero. The outer three veins of the membrane unite at base and radiate from a small dark spot near apex of corium, while the fourth one is sharply angularly bent as described in key.

306 (—). *ISCHNODEMUS ROBUSTUS* sp. nov.

Elongate, large and robust for the genus. Head, apical two-thirds of pronotum, scutellum, except tip, and all the sterna black, opaque, thickly clothed with a very fine silvery-gray pubescence; abdomen both above and beneath pale reddish-brown, similarly pubescent; elytra pale straw-yellow, the bounding veins of clavus and the outer one of corium yellow, discal vein of corium and those of membrane fuscous; antennæ piceous-brown, the incisures pale; legs and basal fourth of pronotum pale reddish-brown. Antennæ very stout, joints 2 and 4 subequal in length, the latter fusiform, 3 one-third shorter than 2. Beak reaching base of prosternum, its second joint but slightly surpassing base of head. Pronotum nearly as wide at base as long, sides subparallel from base to beyond middle, thence converging toward apex, distinctly sinuate at basal third; disk finely and sparsely punctate, the punctures in front of pale basal portion in transverse rows, the latter smooth. Scutellum flat, not carinate but with a smooth median line, elsewhere distinctly punctate. Elytra reaching sixth dorsal; outer three veins of membrane abbreviated and not united at base; fourth vein broadly curved, not angularly bent at basal third. Length, 6—8 mm.

R. P. Park, Fla., March 18—April 4; seven specimens swept from herbage along the margins of the everglades. Allied to *rufipes* but larger and stouter, with antennæ much more robust, pronotum more constricted, abdomen pale and veins of membrane very different. One of the seven is brachypterous, the elytra but slightly overlapping the base of second dorsal.

307 (—). *ISCHNODEMUS ATRAMEDIOUS* sp. nov.

Elongate, slender. Black, thickly clothed with a minute yellowish-gray pubescence, that on head and pronotum in part erect; knobs above hind angles and the very narrow hind margin of pronotum, also a small spot on each side of scutellum, brownish-yellow; corium behind middle of commissure and basal third of membrane dull white, the veins yellowish; membrane with a large round black spot on apical two-thirds; connexivals pale brown, their margins whitish; legs and beak pale brownish-yellow; antennæ piceous, the incisures and tip of fourth joint paler. Antennæ slender, the basal joint stout, surpassing by half its length the apex of head, second and fourth subequal in length, the latter stouter, fusiform;

third about two-thirds the length of second. Beak reaching base of prosternum. Pronotum distinctly longer than wide at base, disk subdepressed with a vague postmedian transverse impression, this and the area just behind it rather coarsely punctate; side margins sinuate opposite this impression, then broadly rounded to the post-apical constriction. Scutellum with a distinct transverse basal ridge, the concavities behind it each side of median carina sparsely, coarsely punctate. Elytra reaching sixth dorsal. Female with fifth ventral as in *rufipes*. Length, 6 mm.

Dunedin, Fla., Feb. 9—March 22. Described from two females, one beaten from dead leaves of cabbage palmetto, the other swept from weeds along a roadside ditch. Longer and stouter than *rufipes* with longer pronotum and very different color of corium and membrane. It is evidently closely allied to the Brazilian *I. tibialis* Stal, which has a similar black spot on membrane, but in that species the femora are black.

308 (492). *ISCHNODEMUS LOBATUS* Van Duzee, 1909, 169.

Elongate, slender, subparallel. Black, clothed with a fine grayish pubescence; basal half of antennæ and legs pale reddish-brown; elytra testaceous, the nervures of corium and veins of membrane darker. Antennæ stout, basal joint short, oval, 2 and 4 subequal in length, the latter distinctly the stoutest, fusiform, 3 two-thirds the length of 4. Beak almost reaching middle coxæ, the second joint surpassing base of head by half its length. Pronotum about one-third longer than wide, sides parallel from base to apical third, thence strongly converging to apex; disk with apical half convex, almost smooth, basal half strongly flattened, rather thickly and finely punctate. Elytra, brachypterous form, reaching middle of second dorsal, the membrane very small. Length, 5—6 mm.

R. P. Park, Fla., Dec. 17. One brachypterous male swept from herbage on margin of everglade. Recorded heretofore only from Estero, Fla.

309 (493). *ISCHNODEMUS SLOSSONI* Van Duzee, 1909a, 233.

Elongate, slender. Above with head, apical two-thirds of pronotum and scutellum black, sparsely clothed with prostrate grayish pubescence; basal third of pronotum, veins of corium and membrane brown, or piceous; abdomen blackish or dark brown, thickly clothed with minute silvery-gray pubescence; disk of corium and membrane white; under surface black, legs pale reddish-brown. Antennæ with joints 1 and 2 and basal half of 3 pale; remainder piceous. Beak reaching middle of mesosternum. Pronotum oblong, convex in front of middle, sides parallel from base to beyond middle, thence abruptly rounded and converging toward apex; disk with a postmedian coarsely punctured transverse impression, the area behind this pale. Scutellum almost smooth without basal ridge, its carina evident but feeble. Elytra, brachypterous form, reaching only to middle of second dorsal, in macropterous to apex of fifth dorsal. Sixth ventral of female narrowed and prolonged obliquely forward, its apex ending beneath fourth and shutting off the fifth from the median line of abdomen. Length, 4.5—5.2 mm.

Dunedin and R. P. Park, Fla., Feb. 16—March 13. Taken at Dunedin by sweeping herbage in low moist places; at the Park by sifting grass-roots in rocky pine glades. Described from Jacksonville, Fla., and Raleigh, N. Car.; recorded elsewhere only from Little River, Fla. In the macropterous form the inner two veins of membrane are united at apex, the outer three entire, separate at base.

310 (—). *ISCHNODEMUS MINUTUS* Blatchley, 1925, 45; 1925a, 245.

Elongate, very slender. Brachypterous form with body wholly black, thickly clothed with very fine silvery-gray pubescence, the head and pronotum with a bluish tinge; pronotum with a velvety black bar across the basal fourth; antennæ and legs pale brownish-yellow, the apical joint of former piceous-black; beak dark brown, the basal joint paler; elytra as in key. Antennæ about as long as head and pronotum united, joint 1 not passing tip of tylus, 2 and 3 slender, the latter slightly the shorter, 4 fusiform, one-half longer and much stouter than either. Beak reaching middle coxæ. Pronotum subquadrate, its disk nearly evenly convex, finely, evenly and sparsely punctate, without either transverse or longitudinal impression, its sides parallel from base to middle, rounded and converging near apex. Scutellum small, flat, impunctate. Elytra reaching only to base of second dorsal, their tips narrowly rounded and separated by a space nearly equal to their width, their inner margins oblique. Length, 3—3.3 mm. (Fig. 78).

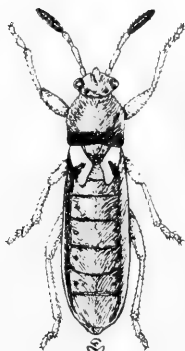


Fig. 78, X 11.
(Original).

Dunedin and R. P. Park, Fla., Dec. 4—March 31. A dozen or more specimens were taken at Dunedin in February and March by sifting the roots of tufts of grass in low moist grounds. At the Park eight were taken in December and March in the same manner. It is our smallest and blackest species, easily known by the subquadrate, evenly convex pronotum with black basal cross-bar, large piceous apical antennal and small white elytral pads. Originally described as *I. pusillus*, which name was preoccupied by Dallas for a South African species.

311 (495). *ISCHNODEMUS BADIUS* Van Duzee, 1909, 168.

Elongate, very slender. Pale chestnut-brown, the pronotum, connexivum and legs dull yellow; scutellum and a submarginal line along each side of dorsal surface of abdomen dark brown; elytra dull yellow, the veins darker; antennæ either wholly dark brown or with the basal joints slightly paler. Beak reaching middle coxæ, its second joint surpassing head by nearly half its length. Second and fourth antennals subequal in length, third shorter. Pronotum oblong, sides straight and

parallel from base to beyond middle, thence converging to apex; disk with a vague broad postmedian, sparsely punctured transverse impression in front of which is a distinct median longitudinal impressed line. Elytra very small, reaching base of second dorsal, finely punctate, each puncture with a short yellow hair; membrane narrow, whitish-hyaline. Length, 5—7 mm.

Dunedin, Fla. (*H. S. B.*). St. Petersburg, Fla., April 28 (*Barber*). Known elsewhere only from Tampa and Clearwater, Fla. A subarctic species occurring on coarse grasses along the shores of bays.

II. BLISSUS Burmeister, 1835, 290.

Small oblong-oval species having the head declivent, its width across eyes about one-half that of hind margin of pronotum; antennæ about as long as head and pronotum united, basal joint slightly surpassing tip of tylus, fourth joint fusiform, stouter and longer than second, third one-half to two-thirds the length of fourth; pronotum convex at middle, thence declivent, both in front and behind; scutellum rarely carinate; connexivum very narrowly exposed, males, more distinctly so, females; membrane in macropterous forms reaching almost to tip of abdomen, in brachypterous ones only to third dorsal; front coxal cavities open along hind margin of prosternum. Other characters as in key. Two species and three varieties occur in the eastern states.

KEY TO EASTERN FORMS OF BLISSUS.

- a. Pronotum not prominently and abruptly silvery-gray in front of middle; corium and membrane with veins straw-yellow.
- b. Pubescence of pronotum not long, erect and tawny-yellow in hue.
- c. Pronotum and scutellum densely and coarsely punctate; abdomen at least twice as long as head and pronotum united; fourth joint of antennæ double the length of third. 312. *VALIDUS*.
- cc. Pronotum and scutellum finely, more sparsely punctate, the punctures separated by at least their own diameters; abdomen less than twice as long as head and pronotum united; fourth antennal one-half longer than third.
- d. Antennæ with apical half of third joint and all of fourth black; apical spot of corium piceous. 312. *LEUCOPTERUS*.
- dd. Antennæ with first three joints and base of fourth dull yellow; apical spot of corium brown or paler. 313a. *var. ARENARIUS*.
- bb. Pubescence of pronotum and sides of abdomen in great part long, erect and a tawny-yellow in hue. 313b. *var. HIRTUS*.
- aa. Front half of pronotum densely clothed with prostrate silvery-gray pubescence, this contrasting strongly with the deep velvety black of hind portion; corium and membrane with veins whitish, colorous with the disk. 313c. *var. INSULARIS*.

312 (—). *BLISSUS VALIDUS* sp. nov.

Elongate-oval. Black, sparsely clothed with grayish pubescence; corium, clavus and membrane dull whitish-hyaline with veins tawny-yellow the apex of corium piceous; antennæ with joint 1 and basal half of 2 yellow, remainder piceous; legs and beak pale brownish-yellow. Beak reaching metasternum. Pronotum subquadrate, sides slightly sinuate at basal third, thence broadly rounded to apex; disk, except the nodules of hind angles, everywhere closely and coarsely punctate. Scutellum similarly punctate, with an evident but faint apical carina. Abdomen of female very long, strongly narrowed at base to opposite apex of clavus, thence gradually expanded and widest behind apex of corium. Female with apex of fifth ventral reaching middle line of abdomen. Length, 4.7 mm.

Marion Co., Ind., Oct. 31. Taken by sifting. Much longer and more parallel than *leucopterus* or any of its varieties, with very different sculpture of pronotum, the fourth antennal as long as second and third united.

313 (496). *BLISSUS LEUCOPTERUS* (Say), 1832, 14; I, 329.

Oblong-oval. Black, subopaque, thickly clothed with fine appressed pubescence, in fresh specimens, that on front half of pronotum with a faint silvery-gray tinge; elytra, including membrane, milky-white, the veins tinged with yellowish; apex of corium with a large blackish spot; tip of second joint of antennæ and joints 3 and 4, piceous, remainder pale brownish-yellow; very narrow hind margin of pronotum brownish; legs and beak brownish-yellow. Pronotum shorter and more convex than in *arenarius*, sides not sinuate, broadly rounded in front; disk minutely subobsoletely punctate; scutellum similarly punctate, without evident carina. Abdomen of female slightly narrowed at base, feebly broadly rounded behind apex of clavus. Length, 3.8—4.2 mm. (Fig. 79).

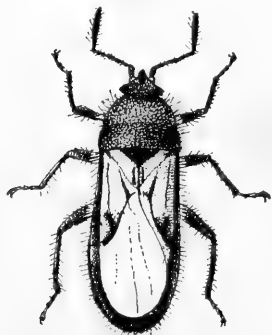


Fig. 79, X 9. (After Lugger).

This is the destructive "chinch-bug" which annually does millions of dollars of damage to cereal and other crops, in the states between the Allegheny and Rocky Mountains. It occurs throughout Indiana, but is more common in the central and southern portions; hibernating as adult in vast numbers beneath fallen grass and piles of weeds, in fodder shocks and other cover along the borders and within cultivated fields. There are usually two broods each year, the young of the first appearing in May and June in time to attack the juicy stems of

young wheat and corn, those of the second in August and September, the adults of this brood surviving the winter. Full accounts of the life history and remedies are given in various publications of the U. S. Bureau of Entomology, notably those of F. M. Webster, issued as Bulletin 69 and Circular 113.

The known range of typical *B. leucopterus* extends from Quebec and New England west to Vancouver, Dakota and Colorado and south and southwest to Florida, Texas and Mexico. It has also been recorded from a few isolated stations in Arizona, California and Washington. East of the Alleghenies it is single brooded and is much less common than in the Central West, seldom occurring in sufficient numbers to do much damage. In Florida I have taken the typical form at Lakeland, Moore Haven and Dunedin, though the majority of those found about Dunedin and other seacoast localities belong to var. *insularis* Barb. The insect has many natural enemies, chief among which are the quail, several species of ground beetles and Heteroptera and the chinch-bug fungus, *Sporotrichium globiferum* Speg., this fungus being especially beneficial in wet seasons.

313a (—). *BLISSUS LEUCOPTERUS ARENARIUS* Barber, 1918a, 38.

"Longer and narrower than *leucopterus* Say, the abdomen being distinctly longer than head and thorax united. Villosity of pronotum shorter, less dense, and grayish. Hemelytra with membranous area more sordid white, the veins limiting the clavus and those of posterior margin and other parts of corium for the most part stramineous or faintly tinged with brown; legs ochraceous." (*Barber*). Other characters as in key. Length, 3.7 mm.

Rockaway Beach, Long Island, N. Y., May 25 (*Barber*). The types were "collected on a species of sand grass growing back of the sand dunes along the ocean beach" at Sandy Hook, N. J., and Coney and Long Islands, N. Y.

313b (497). *BLISSUS LEUCOPTERUS HIRTUS* Montandon, 1893a, 405.

More robust than typical *leucopterus* with longer, denser and more erect yellowish hairs on pronotum and sides of abdomen; femora often dark brown. Length, 4—4.3 mm.

Cascade Lake, Adirondack Mountains, Aug. 18 (*Barber*). Occurs mainly in the higher regions of Canada and the eastern states. The unique type was from Hazelton, Pa., and, according to Barber (1918a, 38), "was unusual in lacking the piceous spot at the apex of the corium."

313c (—). *BLISSUS LEUCOPTERUS INSULARIS* Barber, 1918a, 38.

"Shorter and narrower than typical *leucopterus*. Antennæ with terminal segment relatively shorter. Pronotum deep velvety black, anteriorly prominently silver-gray, the villosity shorter and sparser. Hemelytra appearing more whitish, the veins not stramineous but concolorous with the whitish membranous areas; commissural margin of the clavus, apical margin of corium, median vein apically and apical spot strongly piceous. Femora frequently castaneous." (*Barber*).

Dunedin and R. P. Park, Fla., Dec. 3—April 9. Frequent at Dunedin in bunches of grass-roots along the bay front; also beneath boards in sandy localities one-half mile inland. While Barber states that "this variety inhabits the coastal strip of Florida and that there it is always brachypterous," both long- and short-winged forms were among those taken on the beach at Dunedin, the latter, however, predominating. In Porto Rico he found both macropterous and brachypterous forms. It is but a color variety of *leucopterus* which is found in sandy regions. The specimens of the typical form occurring in sandy places in Indiana have the front half of pronotum more silvery-gray than those from non-sandy localities, and Say, in his original description of his Virginia type, says "thorax tinged with cinereous before."

Subfamily IV. *GEOCORINÆ* Stal, 1862a, 212.

Small oblong-oval species having the head broader than long; eyes very prominent, projecting backward and overlapping the front of pronotum (fig. 80); antennæ shorter than head and pronotum united, first joint not exceeding apex of head, third and fourth usually subequal, second slightly longer; beak reaching middle coxæ; pronotum transverse, sparsely punctate, not carinate or separated into distinct lobes; scutellum elongate-triangular, apex acute; clavus long, very narrow, the commissure absent or very short; elytra in macropterous forms covering the abdomen, the membrane large and extending beyond its tip, in brachypterous ones very small, not surpassing fifth dorsal. Females with sides of fifth and sixth ventrals narrowed, slightly overlapping, reaching the median line of abdomen. Other characters as in subfamily key. The subfamily comprises two genera, both represented in the eastern states.

KEY TO GENERA OF SUBFAMILY *GEOCORINÆ*.

- a. Head more or less punctate or rugulose; third and fourth joints of antennæ subequal, second longer; first joint of beak longer than

second; eyes not obviously stalked, their inner margins usually almost contiguous with front side margins of pronotum.

I. GEOCORIS, p. 373.

- aa. Head smooth; second and fourth joints of antennæ subequal, third shorter; first joint of beak equal to or shorter than second; eyes obviously stalked, not in contact with front side margins of pronotum.

II. HYPOGEOCORIS, p. 378.

I. GEOCORIS Fallen, 1814, 10.

Short robust species, possessing the characters of subfamily and of generic key and being especially notable for the broad head with its very large curved, backward projecting eyes. Ocelli very small, placed close to the inner border of eyes; scutellum as long as or longer than wide, clavus not or but slightly surpassing its tip; pleura coarsely punctate; femora but little swollen, unarmed. Some of the species are known to prey upon other Heteroptera and it is probable that all are more or less predaceous in habits. Ten species are known from North America, five of which occur in the eastern states.

KEY TO EASTERN SPECIES OF GEOCORIS.

- a. Groove of tylus extending back onto vertex and crossed near middle by a sinuate transverse sulcus; femora dotted with brown; scutellum with a prominent smooth calloused yellow spot each side of base. 314. PUNCTIPES.
- aa. Groove of tylus not reaching back onto vertex, not crossed by a transverse sulcus; femora not or rarely dotted; scutellum without prominent elevated smooth spots at base.
 - b. Scutellum longer than wide, usually brownish or piceous with a punctate yellow spot each side of middle; color grayish-yellow.
 - c. Corium sparsely punctate, the punctures in evident rows; femora usually in great part or wholly piceous; macropterous form only known. 315. BULLATUS.
 - cc. Corium thickly irregularly punctate; femora wholly pale or faintly dotted with fuscous; both macropterous and brachypterous forms known. 316. DISOPTERUS.
- bb. Scutellum equilateral, as wide at base as long.
 - d. Pronotum and corium coarsely, irregularly punctate, the latter with a large smooth area near middle; scutellum wholly black or piceous; upper surface in great part black or piceous. 317. ULIGINOSUS.
 - dd. Pronotum and corium finely, evenly and shallowly punctate, the latter without smooth area; scutellum and upper surface pale grayish-yellow. 318. FRISONI.

314 (498). GEOCORIS PUNCTIPES (Say), 1832, 18; I, 336.

Oblong-oval, robust. Above grayish-yellow; head between eyes, a curved mark each side of apical third of pronotum and the scutellum,

usually in great part, piceous; front of head and a spot each side of scutellum yellow; antennæ with joints 1 and 2 usually fuscous, the others pale; beneath dull yellow at middle, sides piceous, legs yellow, femora with brown dots. Head flattened, smooth, polished, not punctate but with grooves as mentioned in key. Pronotum subelliptical, angles rounded, disk coarsely, sparsely punctate, the apical third with a curved smooth area each side. Scutellum as in key, its disk punctate and with a smooth median carina. Length, 3.5—4.2 mm.

Crawford and Posey counties, Ind., July 21—Aug. 30; Dunedin and Sarasota, Fla., Nov. 30—April 20 (*U. S. B.*). Agricultural College, Miss. (*Wced*). An austroriparian species found in Indiana only in the extreme southern part of the State. Frequent about Dunedin, Fla., hibernating beneath cover, and taken by sweeping, mainly in low grounds. Common throughout Florida and ranges from New Jersey west to southern Indiana, Oklahoma and Colorado and south and southwest to Texas, Arizona, California and Mexico. Varies much in fuscous markings of upper surface, those mentioned in description being often vague or wanting, but easily distinguished by its smooth head with cross grooves.

315 (499). *GEOCORIS BULLATUS* (Say), 1832, 18; I, 336.

Smaller than *punctipes*; body but slightly widened behind middle.

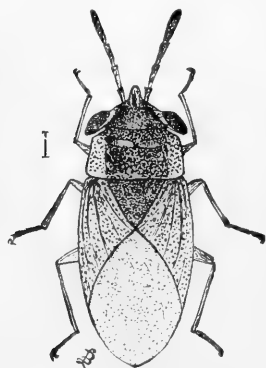


Fig. 80, X 10.
(After Bruner).

Above grayish, often tinged with yellow; head between eyes, base of scutellum and two spots on hind margin of corium blackish; pronotum with two prominent smooth yellow callosities on apical third, these sometimes in part fuscous; antennal joints usually reddish-brown to piceous, their tips paler; under surface piceous, the base of head, sides of coxal cavities and hind margins of pleura whitish yellow; beak and femora in part piceous. Head minutely densely punctate or shagreened between the eyes. Pronotum subquadrate, evenly punctate, more sparsely near base. Scutellum with a flat smooth median line. Length, 3—3.5 mm. (Fig. 80).

Lake and Porter counties, Ind.; probably occurs throughout the State. Found principally in sandy localities, along the margins of lakes and ponds; hibernates as imago beneath cover and taken by sifting in summer and autumn. Dunedin and Key West, Fla., Oct. 26—March 11. Frequent about Dunedin beneath clumps of weeds on the dry white sand of the bay front. Recorded from numerous other localities in Florida. Ranges

from Quebec and New England west to Dakota, Utah and Vancouver, and southwest to Florida and California. Hussey records it as very common in the sand dunes of Berrien Co., Mich., "where numbers of individuals were seen running about on the ground among the sparse grasses; one adult thus running was followed closely in all its erratic course by a nymph of about the third instar."

In addition to typical *bullatus* as above described there occur in our territory two varieties which may be separated from the typical form as follows:

KEY TO VARIETIES OF GEOCORIS BULLATUS.

- a. Joints 1—3 of antennæ reddish-brown or in part fuscous above; pronotum rather sparsely irregularly punctate, its hind margin almost smooth.
- b. Corium with fuscous markings only on internal angle or along hind margin; length, 3.2—4.2 mm. 315. BULLATUS.
- bb. Corium wholly or in great part fuscous to piceous; length, 4.5 mm. 315a. var. BOREALIS.
- aa. Joints 1—3 of antennæ a uniform bluish-green above; pronotum more thickly, evenly and finely punctate to its very base. 315b. var. FLORIDANUS.

315a (499a). GEOCORIS BULLATUS BOREALIS (Dallas), 1852, 585.

Of his *Ophthalmicus griseus*, now recognized as a synonym of *Geocoris bullatus* Dallas (loc. cit.) says in part: "Subtus niger; thorace quadrato, transverso, postice vix latiori. Long, lin. $1\frac{1}{4}$ — $1\frac{1}{2}$." On the same page, of his *O. borealis* he says: "Subtus niger, pectore abdominisque marginibus albido-maculatis; thorace postice latiori. Long, lin. 2." These are the only differences of any note between the descriptions of the two.

Colorado (*U. S. N. Mus.; Cornell Univ. Coll.*). Distant (1882, 199) recognized *borealis* as a distinct species, stating that: "All the Central American species which we have received are constant in character and of the form described by Mr. Dallas, of which I have examined the type." McAtee (1914, 131) makes *borealis* a variety of *bullatus* and records a specimen from Ungava Bay, Labrador. It is recorded elsewhere only from "North America" by Dallas and Guatemala (12,400 feet) by Distant.

315b (—). GEOCORIS BULLATUS FLORIDANUS var. nov.

Smaller than the average *bullatus*, more narrowed and wedge-shaped behind; general color less grayish, more dull yellow; joints 1—3 of antennæ reddish-brown beneath, bluish-green above, 4 wholly pale brownish-yellow; pronotum with outer half of each callus and two oblong spots on hind margin, black; scutellum piceous-brown with a vague yellowish spot each side; femora with numerous small brownish dots. Pronotum with entire surface, including humeral angles, finely and evenly punctate. Characters otherwise as in *bullatus*. Length, 3 mm.

Dunedin, Fla., Dec. 2; a single specimen swept from low huckleberry along the margins of Jerry Lake. The taking of additional examples may show this to be a valid species.

316 (499c). *GEOCORIS DISCOPTERUS* Stal, 1874, 136.

Oblong-oval; in both sexes distinctly widest behind the middle. Color much as in *bullatus*, more tinged with reddish-brown; head with smaller reddish-brown instead of blackish spot between the eyes; scutellum less piceous at base, the yellow spots on sides longer; antennæ with first joint blackish, its apex yellow, remaining joints reddish-brown to piceous; legs wholly pale; beak, except base, piceous-black. Head, pronotum and scutellum as in *bullatus*. Corium (brachypterous form) much more widened behind, wholly coriaceous, thickly irregularly punctate; hind margin obliquely broadly rounded and forming a commissure half the length of scutellum, instead of straight and oblique from apical angle to apex of scutellum as in *bullatus*; membrane very short, reaching base of fifth dorsal. Abdomen with sides distinctly curved, widest behind apex of scutellum. Length, 2.8—3.5 mm.

Crawford and Posey counties, Ind., July 12—Nov. 1. Described from New Jersey and ranges from New England to southern Indiana. Recorded also by Parshley (1919, 16) from Vancouver. Van Duzee, following McAtee, has made this a variety of *bullatus*, but if form of body and texture and sculpture of elytra count for anything in taxonomy, it is a distinct species.

317 (502). *GEOCORIS ULIGINOSUS* (Say), 1832, 19; I, 337.

Oblong-oval; males with sides subparallel to apical fourth of abdomen; females distinctly widened behind the middle. Black, shining, the corium narrowly margined with pale; membrane brownish or whitish-hyaline; antennæ wholly black, female, first and second joints black with pale tips, third and fourth in part or wholly pale, male; legs pale reddish-yellow, male, in great part black or piceous, female. Head densely and very finely rugose-punctate. Pronotum wider than long, disk moderately convex, thickly and rather coarsely punctate, the nodules over hind angles and a transverse elongate spot each side on apical third, smooth. Scutellum as in key, its disk punctate and with a vague median carina. Corium with a submarginal and two inner rows of punctures and also some scattered ones near apex, the disk in great part smooth; membrane in macropterous form slightly surpassing tip of abdomen, male, scarcely or fully reaching its tip, female. Length, 3.5—4 mm.

Marion, Putnam, Vigo and Clark counties, Ind., Jan. 5—Nov. 28; doubtless occurs throughout the State. Ormond, Lakeland, Istokpoga, Ft. Myers and Dunedin, Fla., Oct. 25—April 18. In Indiana the typical form, as above described, is apparently less common than some of its color varieties. It hibernates singly or in pairs beneath logs and other cover, sometimes being found in company with *Blissus leucopterus* (Say) and the Coccinellid

beetle, *Mcgilla maculata* (De G.) ; all three within a space of a few square inches. In summer and autumn it occurs on flowers of *Eupatorium* and other Compositæ along streams and marshes. About Dunedin it is much more frequent than in Indiana, and I have on several occasions taken it in company with *G. punctipes* and *G. bullatus* beneath boards in a country barnyard. It is also frequently found beneath cover along the bay beach and has been taken at porch light.

The known range of typical *uliginosus* covers practically the entire United States and southern Canada, though many of the records probably refer to its color varieties. Uhler (1877, 410) says: 'This is the most common species found in the Atlantic region. It occurs on the ground in dark loamy spots, in woods and near streams, often in places exposed to the sun and around the roots of the horse-nettle, *Solanum carolinense* L.'

In addition to typical *uliginosus*, as treated above, there are, in the eastern states, three forms or varieties recognized by McAtee and Van Duzee which differ only in color from Say's species. These are separated as follows:

KEY TO COLOR VARIETIES OF GEOCORIS ULIGINOSUS.

- a. Head, except at apex, piceous.
 - b. Both pronotum and elytra more or less broadly pale margined, the latter sometimes entirely pale. 317a. var. SPECULATOR.
 - bb. Pronotum entirely piceous or with traces of pale along the sides.
 - c. Costal margins of elytra entirely piceous or narrowly pale margined. 317. ULIGINOSUS.
 - cc. Elytra broadly pale margined. 317b. var. LATERALIS.
 - aa. Head light reddish-brown or testaceous; pronotum and elytra broadly pale margined, the latter sometimes entirely pale. 317c. var. LIMBATUS.
- 317a (502b). GEOCORIS ULIGINOSUS SPECULATOR Montandon, 1908, 227.

Differs from the typical form only in the color characters given in key and by having the legs of female wholly pale brownish-yellow. Form somewhat more robust. Length, 3.3—4 mm.

Marion Co., Ind., June 16. Ranges from Massachusetts to British Columbia, California and Texas.

317b (502c). GEOCORIS ULIGINOSUS LATERALIS (Fieber), 1861a, 271.

This variety hardly deserves a special name, the only difference between it and typical *uliginosus* being in the relative width of the pale margin of elytra. Specimens with all degrees of this width occur, so that the two forms intermerge wherever found.

Southern half of Indiana, frequent, July 11—Dec. 3. Dunedin, Fla., March 16. Occurs with the typical form throughout

most of its range. The young, probably of a second and hibernating brood, appear to be most common in September, all stages being then found beneath leaves and other cover along sandy banks of streams.

317c (502d). *GEOCORIS ULIGINOSUS LIMBATUS* Stal, 1874, 136.

Easily distinguished by its reddish-brown or paler head and pale side margins of pronotum. Structural characters the same as in the typical form, but brachypterous individuals more frequent. In these the membrane is very short, reaching base of fifth dorsal.

Marion and Putnam counties, Ind., July 14—Oct. 23. Occurs with the typical form and in the northern states often more common. At Buffalo, N. Y., Van Duzee found it "moderately abundant on damp spots in meadows and grain fields." The best marked variety of the species.

318 (—). *GEOCORIS FRISONI* Barber, 1926, 38.

Oblong-oval, brachypterous. Head dull yellow to reddish-yellow, the ridges of tylus and a curved line about each ocellus paler; pronotum, scutellum and elytra pale grayish-yellow, calli and median carina of scutellum dull yellow; dorsum of abdomen fuscous, connexivals pale yellow; legs and under surface dull yellow, sides of ventrals fuscous-brown; beak piceous, basal joint paler; joint 1 of antennæ yellow, 2 and 3 dusky, 4 fuscous. Pronotum depressed, twice as wide as long, side margins parallel; calli and extreme base smooth, remainder punctate as in key. Scutellum as broad at base as long, closely and evenly punctate, the low median carina smooth. Elytra obovate, reaching middle of fifth dorsal, punctate as in key; membrane hyaline, very short, scarcely overlapping. Length, 3.1—3.3 mm.

Vigo Co., Ind., Jan. 5—April 4 (H. S. B.). Arenzville, Ill., Aug. 14 (*Barber*). Occurs only in sandy localities, hibernating beneath mullein leaves and other cover. Varies somewhat in color, the head, scutellum, under surface and legs sometimes in great part fuscous. Known only from Indiana and Illinois.

II. *HYPOGEOCORIS* Montandon, 1913, 55.

Short oval species differing from *Gecoris* mainly by the characters given in generic key. Upper surface, except head and membrane, coarsely, rather sparsely irregularly punctate; ocelli placed midway between inner margin of eye and middle of vertex; beak reaching hind coxæ; clavus very narrow but slightly more elevated than corium. The *Isthmocoris* of McAtee (1914, 127) is a synonym. Two species are known, both occurring in our territory.

KEY TO SPECIES OF HYPOGEOCORIS.

- a.* Color above in great part piceous; corium sparsely and irregularly punctate over the entire disk. 319. PICEUS.
aa. Head, elytra and pronotum in part, dull yellow or reddish-yellow; punctures of corium mostly in rows near the clavus.

320. IMPERIALIS.

319 (507). *HYPOGEOCORIS PICEUS* (Say), 1832, 18; I, 336.

Broadly oval, robust. Piceous, shining; head, base of first, apex of third and usually all of fourth antennal, beak and legs reddish-yellow or pale reddish-brown. Head, and front half of pronotum except submarginal line, impunctate. Pronotum subtrapezoidal, sides feebly converging from base to apical fourth, thence more strongly so to apex; basal half of disk with four nearly regular transverse rows of punctures. Scutellum equilateral, margins elevated; disk coarsely irregularly punctate without median carina. Corium sparsely irregularly punctate. Membrane (macropterous form) exceeding tip of abdomen, Length, 4—4.2 mm.

Porter Co., Ind., May 5, scarce; probably occurs only in the Transition Life Zone of the northern fourth of the State. Ranges from New England west to Wisconsin and Colorado, and south to Maryland and Biscayne Bay, Fla. About White Plains, N. Y., Bueno took it in early autumn by sweeping patches of five-finger, *Potentilla canadensis* L., and also under boards.

320 (509). *HYPOGEOCORIS IMPERIALIS* (Distant), 1882, 197.

Broadly oval, robust. Antennæ, a large quadrate or transversely oblong spot on middle of base of pronotum, scutellum and under surface, except of head, black or piceous; head, front and side margins of pronotum, elytra except membrane, legs and under surface of head, dull yellow often in part with a reddish tinge; membrane whitish-hyaline. Pronotum with an elevated transverse almost smooth callus near front margin, the dark median area behind this and also the scutellum very coarsely punctate. Elytra entire; corium with three rows of punctures near clavus and a few scattered ones near apex. Length, 3.5—4 mm.

Dunedin, Fla., Feb. 7—April 4; a half dozen specimens taken from beneath gunny-sacks spread out along the margins of an orange grove. Described from Guatemala and known heretofore in this country only from Louisiana and Texas. Distant, in his original description, states that the pronotum has a double row of coarse punctures near front margin and that the basal dark spot of pronotum is lunate, characters which do not apply to the specimens at hand.

Subfamily V. *PACHYGRONTHINÆ* Stal, 1865, II, 121, 145.

Small, rather robust, oblong or elongate species having the head more or less declivent, inserted in thorax to eyes; pro-

notum not sufficiently constricted or impressed to form two distinct lobes, its hind margin straight; elytra punctate, the punctures in evident rows; front femora much swollen and armed beneath with several small unequal teeth or spines; corium not wider than abdomen; membrane with all the veins running from the base, the two inner ones not connected. Other characters as in subfamily key. Three genera are included in the subfamily, two of which are represented in the eastern states.

KEY TO EASTERN GENERA OF PACHYGRONTHINÆ.

- a.* Head strongly declivent, almost vertical; antennæ with first joint shortest, not reaching tip of tylus; scutellum subequilateral, not calloused each side at base; clavus very narrow, its commissure scarcely evident. I. PHLEGYAS, p. 380.
- aa.* Head but feebly declivent; first antennal longest, much surpassing tip of tylus; scutellum slightly longer than wide and with a pale calloused spot each side of base; clavus wider, more so near apex, its commissure distinct. II. CÆDANCALA, p. 382.

I. PHLEGYAS Stal, 1865, II, 145.

Small oblong, robust species having the antennæ but slightly longer than pronotum, second joint longest, nearly three times the length of first, third and fourth subequal; cheeks not carinate; front of head flattened; pronotum subtrapezoidal, but slightly narrowed in front; elytra usually narrower than abdomen; hind margin of corium feebly sinuate toward apex of clavus, its outer apical angle rounded; connexivum usually widely exposed. Female with fourth ventral very narrow at middle, fifth with sides very long, narrowed and meeting beneath middle of fourth. Two species occur in the eastern states.

KEY TO EASTERN SPECIES OF PHLEGYAS.

- a.* Antennæ stout, second joint twice the length of first; color above a nearly uniform dull brownish-yellow; form subcylindrical, elongate, sides subparallel; membrane clear milky-white. 321. ANNULICRUS.
- aa.* Antennæ slender, second joint nearly three times the length of first; color above in part fuscous; form stouter, more oblong; membrane clouded with fuscous. 322. ABBREVIATUS.

321 (511). PHLEGYAS ANNULICRUS Stal, 1869, 230.

Elongate, slender, subparallel. Above dull brownish-yellow, the head and pronotum thickly clothed with silvery white pubescence; apical

margin of corium with two fuscous dashes; hind margin of each connexival black; antennæ dull yellow, the first and second joints annulate with blackish; under surface pale brown, thickly silvery-pubescent; apical half of sixth ventral and some spots on sides and incisures blackish; femora black, knees pale, tibiæ annulate with black near apex. Pronotum relatively longer and narrower than in *abbreviatus*, the transverse impression wider and deeper; disk without median carina, densely and finely punctate. Scutellum with carina fine but entire. Elytra in macropterous form narrower than abdomen, reaching almost to its tip, but leaving the connexivum widely exposed. Length, 4.5—5 mm.

Black Mts., N. Car., Aug. 14 (*Barber*). Described from "Carolina" and recorded from "Florida" (*Barber*, 1914); also from New Jersey, Texas and California.

322 (513). PHLEGYAS ABBREVIATUS (Uhler), 1876, 313.

Oblong, robust. Dull reddish-brown or brownish-yellow, the head, middle of pronotum, scutellum and under surface, more or less densely clothed with a fine iridescent yellowish-gray pubescence, this easily denuded and often absent. Pronotum usually with a black transverse band in front of middle and another across base, these often interrupted to form black spots, sometimes wholly absent. Carina of scutellum, margins of corium in part, entire dorsum and a spot on each connexival, blackish; membrane whitish-hyaline, usually with some vague oblique fuscous marks; antennæ reddish-brown or piceous, the incisures paler; ventral surface of abdomen irregularly blotched with piceous; femora black, their tips pale; tibiæ black with a pale ring at base and another at apical third. Beak reaching middle coxæ. Pronotum subconvex, thickly and coarsely punctate, the median carina very narrow, obsolete toward base. Elytra dimorphic in length, in macropterous forms reaching tip of abdomen and covering the connexivum, in the much more abundant brachypterous ones only to third or fourth dorsal. Length, 3—5 mm.

Common in all parts of Indiana, occurring throughout the year. Hibernates as imago beneath chunks and piles of rubbish and taken from April to October by sweeping weeds and grass in meadows, pastures and waste places. Dunedin and Moore Haven, Fla., scarce, March 24—April 1; these being the first definite locality records from that State. Sherborn, Mass., Sept. 20 (*Frost*). Ranges from Quebec and New England west to Nebraska and Colorado and south and southwest to Florida and Texas. In color, size and facies this species is exceedingly variable. In one Indiana specimen at hand the elytra, except a small spot near apex of corium, and also the membrane, are wholly black. Only about one individual out of twenty is macropterous.

II. *ÆDANCALA* Amyot & Serville, 1843, 258.

Elongate, rather robust species having the head slightly declivent, longer than wide; antennæ slender, first joint as long or longer than head, its apex slightly enlarged; cheeks carinate, slightly reflexed, shorter than tylus; beak reaching on to mesosternum; pronotum trapezoidal, sides straight, evenly converging from base to apex, disk finely evenly punctate and with a pale smooth median line; scutellum without a similar line; elytra covering the abdomen and reaching its tip, hind margin of corium straight. Females with fifth ventral as in *Phlegyas*. Two species occur in the eastern states.

KEY TO EASTERN SPECIES OF *ÆDANCALA*.

- a. First joint of antennæ almost or quite as long as second and third united; front femora not darker beneath. 323. *DORSILINEA*.
- aa. First antennal scarcely two-thirds as long as second and third united; front femora shining black or piceous beneath. 324. *DORSALIS*.

323 (514). *ÆDANCALA DORSILINEA* Amyot & Serville, 1843, 258.

Elongate, more slender than the next. Above pale brownish-yellow; a short line between ocelli, median smooth line of pronotum and a short oblique calloused spot each side of base of scutellum, pale yellow; hind margin of corium with a dark dash near middle; under surface reddish-brown, finely and densely silvery-pubescent; legs brownish-yellow, the femora dotted with darker spots. First joint of antennæ as long as pronotum; 2—4 much shorter, subequal. Pronotum longer and more narrowed at apex than in *dorsalis*; disk more finely and closely punctate. Front femora very strongly swollen, and armed beneath with two rows of very short irregular black-tipped teeth. Length, 6.5—7 mm.

Common throughout Florida, Nov. 22—April 22. Yaphank, Long Island, N. Y. (*Davis*). Taken by me at all collecting stations in Florida except Cape Sable and Key West, by sweeping weeds and other vegetation along roadsides and borders of fields; also dead grasses in pine woods and along the borders of wet-weather ponds. Ranges from New York southwest to Florida and Texas. Berg (1879, 107) lists it from Argentina, but according to Pennington (1920, 19) the species found there is *dorsalis* Say. It is a longer, less bulky and paler species than *dorsalis*, with pale spots on scutellum shorter and antennæ very different in relative length of joints.

324 (515). *ÆDANCALA DORSALIS* (Say) 1832, 17; I, 335.

Elongate, moderately robust. Above dull yellow tinged with reddish or fuscous; tylus, short line on vertex, median line and narrow side

margins of pronotum, elongate calloused spot each side of scutellum and narrow edge of connexivum, pale reddish-yellow; disk of scutellum and commissure blackish; beneath piceous, clothed with a very fine grayish pubescence; legs pale brownish-yellow, under surface of front femora shining black. Antennæ with first joint about one-third longer than the others, which are subequal. Pronotum shorter than in *dorsilinea*, more coarsely, less densely punctate, the median line not reaching base or apex. Scutellum with irregular pale calloused stripe each side extending almost to apex. Connexivum in female often narrowly exposed. Front femora as in *dorsilinea*, the teeth more numerous and a little longer. Length, 6—6.3 mm. (Fig. 81).

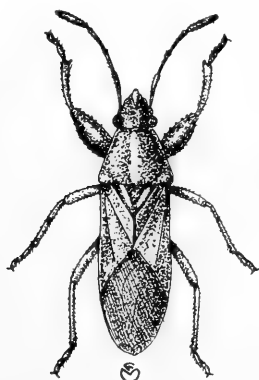


Fig. 81, X 6. (Original).

Frequent throughout Indiana, May 13—Oct. 17. Taken by sweeping herbage in wet meadows, pastures and waste places; also in late October in small colonies beneath logs along the borders of woodland. Ranges from Quebec and New England west to South Dakota and Colorado and southwest to South Carolina, Oklahoma and Texas. Uhler (1877, 411) says that in the eastern states "it appears to be single-brooded and is rarely found later than in the early part of summer." Van Duzee (1888, 27) mentions it as breeding about Buffalo, N. Y., on the fox-sedge, *Carex vulpinoidea* Michx., and other species of *Carex* and *Cyperus*, the young being found in July. This species is considered by Stal (1874, 139) to be a synonym of *Lygaeus crassimana* Fabr. (1803, 233) from Canada, but that was described as having the fore femora unarmed. Until the type of *crassimana* can be compared, Say's name should stand.

Subfamily VI. OXYCARENINÆ Stal 1862a, 212.

Small oval Lygaeids distinguished mainly by the characters given in subfamily key. Two genera are included, one being represented in the eastern states.

I. CROPHIUS Stal, 1874, 141.

Elongate-oval or obovate species, widest behind and having the head porrect, convex, densely punctate, slightly wider across the eyes than front of pronotum; antennæ slender, longer than head and pronotum united; beak reaching middle

of mesosternum; pronotum subtrapezoidal, densely punctate, feebly constricted near middle; scutellum equilateral, punctate, not carinate; elytra punctate, surpassing the abdomen, costal margin expanded, hyaline, feebly recurved; membrane with four nearly straight veins, its apex broadly rounded; prosternum not sulcate, meso- and metasterna distinctly sulcate; front femora moderately swollen, armed beneath with a single small subapical tooth. Seven species are known from North America, but only one occurs in the eastern states.

325 (519). *CROPHIUS DISCONOTUS* (Say), 1832, 14; I, 330.

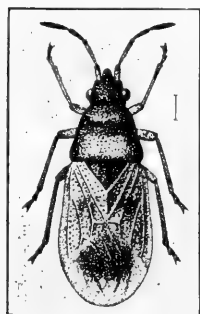


Fig. 82, X 9.
(After Van Duzee).

Elongate-oval, slightly widened behind. Head, pronotum and scutellum dark fuscous-brown, the hind lobe of pronotum often paler; elytra whitish-hyaline, the punctures and nerves fuscous; membrane whitish-hyaline, but reflecting the black dorsum; first and second antennals reddish-brown, third and fourth blackish-fuscous; abdomen dark brown, shining, broad hind margin of metapleura white; femora reddish-brown; tibiae and tarsi pale yellow, darker at base and tips. Antennæ with first joint short, stout, slightly passing tip of tylus; second slender, longer than third, fourth longest, fusiform. Other characters as above. Length, 3—3.7 mm. (Fig. 82).

Roselle Park, N. J., April 25 (*Barber*). Not taken, but should occur in Indiana. Ranges from Quebec and New England west to Missouri and southwest to Alabama. Recorded also by Uhler from Utah and California. Van Duzee once found it in numbers in September on goldenrod.

Subfamily VII. *RHYPAROCHROMINÆ* Stal, 1862a, 210.

The characters set forth in the key, p. 339, are the principal ones of importance separating this subfamily of Lygæidæ from those preceding. Our eastern species have the first two segments of beak united much longer than head, the first one alone as long or almost as long as head; ocelli not widely separated; females with fifth and sixth ventrals much narrowed toward middle, not obliquely prolonged forward as in preceding subfamilies, but nearly vertical, the tips of the sixth meeting on the median line of the apically compressed abdomen. It is by far the largest of the subfamilies, comprising all the remaining species of the family, or more than all the others combined. For convenience of treatment Barber (1918, 71), following

Stal, separates the subfamily into six tribes. Of these five are represented in North America and the eastern states.

KEY TO EASTERN TRIBES OF SUBFAMILY RHYPAROCHROMINÆ.

a. Fourth ventral with the two small glandular opaque spots near side margin widely separated, the hind one much nearer the hind margin of the segment than to the front spot (fig. 70).

b. Pronotum with side margins of front lobe obtusely rounded or terete, never carinate or laminate-expanded; disk of pronotum usually strongly constricted transversely to form two distinct lobes, the front one usually with a ring-like collar behind front margin. Tribe I. MYODOCHINI, p. 385.

bb. Pronotum with side margins of front lobe not obtuse or terete, but carinate or laminate-expanded; disk of pronotum rarely strongly constricted transversely to form two lobes, or if so, the front one rarely with a collar and the head then strongly exserted.

c. Side margins of pronotum carinate, not laminate-expanded; pronotum usually wholly black or reddish-brown, the hind lobe rarely paler; head deeply inserted in thorax, rarely (*Ozophora*) more exserted and the pronotum then with a collar; hind tibiæ usually pilose without rigid bristles.

Tribe II. RHYPAROCHROMINI, p. 414.

cc. Side margins of pronotum and in part the costal margin of corium laminate-expanded and usually in part pale; pronotum with hind lobe usually pale or variegated with pale; hind tibiæ furnished with long rigid bristles.

d. Three basal segments of antennæ without rigid bristles; narrowly expanded side margins of pronotum not or very sparsely punctate; disk of front lobe of pronotum usually smooth or sparsely punctate. Tribe III. BEOSINI, p. 423.

dd. Three basal segments of antennæ provided with rigid setose bristles; widely expanded side margins and disk of pronotum and corium usually thickly punctate.

Tribe IV. GONIANOTINI, p. 428.

aa. Fourth ventral with the posterior glandular opaque spot on sides placed more closely to front spot than the hind margin of the segment, sometimes the segment with a third spot near hind margin; side margin of pronotum usually expanded, often more so between the lobes.

Tribe V. LETHÆINI, p. 429.

Tribe I. MYODOCHINI Stal, 1872b, 51.

This tribe, as characterized in the above key, comprises species less depressed and more narrowly elongate than those in the tribes which follow. The tribe is represented in the eastern states by twelve of its fourteen known North American genera.

KEY TO EASTERN GENERA OF MYODOCHINI.

a. Head very elongate, its base drawn out into a long cylindrical neck; the two lobes of pronotum subequal in length, front one with a distinct collar (fig. 83). I. MYODOCHA, p. 387.

aa. Head never extended behind into a long curved neck.

b. Pronotum usually constricted at or slightly behind the middle, the front lobe black and (except in some *Ptochiomera*) never more than twice as long as hind one (fig. 69).

c. Head not inserted in thorax to eyes; front lobe of pronotum with a constricted ring-like collar; body more or less elongate.

d. Head strongly exerted forming a short neck at base, the postocular space about four times as long as that between base of antennæ and eye (fig. 84); eyes placed at or near middle of head.

II. HERÆUS, p. 389.

dd. Head much less exerted, usually strongly contracted just behind eyes, the postocular space subequal to that between base of antennæ and eye.⁵⁰

e. Front lobe of pronotum globose, almost the diameter and about twice the length of hind one; head and front lobe of pronotum shining; scutellum much longer than wide.

III. SPHÆROBIUS, p. 391.

ee. Front lobe of pronotum less globose, narrower than the hind one; head and pronotum seldom shining.

f. The two lobes of pronotum separated by a deep clean cut, transverse constriction; first joint of beak not reaching base of head.

g. Second and third ventrals furnished each side with a narrow, lunate, very finely strigose, opaque area (fig. 70).

IV. LIGYROCORIS, p. 392.

gg. Second and third ventrals without lunate strigose areas.

V. ORTHÆA, p. 397.

ff. The two lobes of pronotum separated by a shallow obtuse constriction; first joint of beak reaching base of head.

h. Form of body narrowly elongate with long legs; basal joint of hind tarsus, fully three times as long as the others united; hind tibiæ with rigid bristles only.

VI. ZERIDONEUS, p. 403.

hh. Form of body more broadly oval with shorter legs; basal joint of hind tarsus not more than twice as long as the others united; hind tibiæ with long setose hairs and with a few bristles near apex.

VII. PERIGENES, p. 404.

cc. Head inserted in thorax to eyes; pronotum without a constricted ring-like collar, sometimes with the front margin depressed or furnished with a row of punctures; clavus with two or three rows of punctures; pronotum strongly constricted to form two lobes, both of which are punctate.

i. First antennal surpassing tip of tylus by half or more its length; front margin of pronotum depressed, punctate; surface not shining.

j. Third and fourth antennals not or but slightly thicker than second; front lobe of pronotum convex, transverse, nearly as wide as hind one.

VIII. TOMOPELTA, p. 405.

⁵⁰Except in *Orthæa longulus* (Dall.) and *Perigenes constrictus* (Say).

- jj.* Fourth, and usually the third antennal, distinctly thicker than second (fig. 86); front lobe of pronotum (except in *antennata*) subcylindrical or subglobose, distinctly narrower than hind one. IX. PTOCHIOMERA, p. 406.
- ii.* First antennal scarcely surpassing tylus; front margin of pronotum not depressed; surface very shining. X. KOLONETRUS, p. 411.
- bb.* Front lobe of pronotum three or four times as long as hind one, the constriction between the two shallow and ill-defined; head not inserted in thorax to eyes.
- k.* Front lobe of pronotum impunctate, separated from the hind one by an impressed line and provided with a ring-like collar; ocelli absent; basal segment of hind tarsus three times as long as the others united; length, 7 or more mm. XI. CHEMODUS, p. 411.
- kk.* Front lobe of pronotum sparsely punctate, separated from the hind one by an obtuse sinus, its front margin depressed, punctate; ocelli present; basal segment of hind tarsus twice the length of others united; length not more than 6 mm. XII. PSEUDOCNEMODUS, p. 413.

I. MYODOCHA Latreille, 1807, 126.

Elongate, slender species having the head oval, pointed, longer than pronotum, drawn out behind into a long curved neck; eyes prominent, coarsely faceted; beak reaching mesosternum, its first two joints not reaching base of head; pronotum bell-shaped, its front lobe much the narrower; scutellum elongate-triangular, apex acute; elytra punctate, as wide as abdomen and reaching its tip; first joint of hind tarsus three times as long as others united. Two of the seven known species occur in our territory.



Fig. 83, X 4. (After Lugger).

KEY TO EASTERN SPECIES OF MYODOCHA.

- a.* Fourth antennal wholly dark; elytra brown with pale margin. 326. SERRIPES.
- aa.* Fourth antennal with a broad yellowish ring behind the middle; elytra piceous, the basal half of costal margin narrowly pale. 327. ANNULICORNIS.

326 (526). MYODOCHA SERRIPES Olivier, 1811, 106.

Head and under surface shining black; pronotum and scutellum fuscous-black, opaque; elytra reddish-brown, the costal margin and two small spots near apical margin

of corium yellow; membrane brown with a vague pale spot near apex; second and third antennals pale reddish-brown, first and fourth darker; legs yellow, the apical third of front and hind femora darker. Antennæ with first joint slightly passing tip of tylus, second very slender, longest; fourth stouter, slightly longer than third. Front lobe of pronotum impunctate, hind one with coarse sparse punctures. Scutellum with a row of punctures each side and some scattered ones on disk. Front femora armed beneath near apex with two large and several small spines. Front tibiæ of male slightly curved near base, armed with a single small tooth. Other characters as given above. Length, 8—9.5 mm. (Fig. 83).

Common in southern Indiana, much less so in the northern counties; occurs throughout the year. Hibernates both as imago and nymph beneath various kinds of cover, especially in dry loamy or sandy soil in open upland woods. Often occurs beneath logs in company with *Casnoia pennsylvanica* L., a ground beetle of somewhat similar form. They are the most bizarre species of their respective groups and when their protective cover is removed, unless benumbed with cold, they run hurriedly away, their slender necks and long swaying antennæ giving them an odd appearance as they go. Both bug and beetle are almost exclusively terrestrial in habit and are said to be predaceous. Their long slender necks have perhaps been developed through the reaching into crevices in search of prey. The known range of *M. serripes* extends from New England west to Nebraska and Colorado and south and southwest to Texas and Mexico. It has been recorded from "Florida" by Uhler, and Van Duzee (1909, 171) mentions the taking of "a small larva" at St. Petersburg. These records should probably be referred to *annulicornis* described below. It is not known from Canada and from the records is very scarce in northern New York and Michigan. Uhler (1878, 388) mentions it as "Occasionally common in stubble fields after the wheat and oats have been removed; sometimes also in the straw stored in barns. It may be found hibernating in winter beneath stones, logs and leaves or in stumps of trees behind loose bark." The *M. pectiola* Say (1832, 19) is a synonym.

327 (—). MYODOCHA ANNULICORNIS sp. nov.

Differs from *serripes* in having the elytra darker with pale costal margin less distinct; joint 4 of antennæ subequal in length to 3, broadly annulate with pale yellow, the apical third and extreme base above darker, joint 1 dark reddish-brown, 2 and 3 paler, the apical fourth of

3 blackish; membrane without pale spots and those of corium vague or wanting. Hind lobe of pronotum more coarsely punctate. Length, 9—9.5 mm.

Described from a dozen or more specimens taken at Orange City Junction, R. P. Park and Dunedin, Fla., Dec. 15—April 5. At Dunedin they have been found at intervals throughout the winter beneath piles of dead leaves of cabbage palmetto and other plant debris close to the bay front. At the Park they were beaten from dead leaves of royal palm in the dense hammock on Paradise Key. This species is apparently closely allied to the Mexican *M. longicollis* Stal (1874, 146), in which the last antennal is annulate but the front tibiæ of male straight and unarmed.

II. HERÆUS Stal, 1862, 314.

Small, elongate species having the head oval, exserted and tapering to a distinct neck; antennæ reaching middle of scutellum, first joint but slightly exceeding tip of tylus, third and fourth subequal, second longer; beak reaching middle of mesosternum, its first joint shorter than base of head; front lobe of pronotum subglobose, narrower and slightly longer than hind one; scutellum elongate-triangular, its apex acute; elytra (macropterous forms) covering the abdomen and reaching its tip; front femora swollen and armed beneath with two rows of short irregular spines; hind femora with fine stiff bristles; basal joint of hind tarsi about as long as the others united. Four species are known from North America, two from the eastern states.

KEY TO EASTERN SPECIES OF HERÆUS.

- a.* Head, front lobe of pronotum and scutellum reddish-brown; fourth antennal with a broad pale ring; legs wholly pale brownish-yellow. 328. TRIGUTTATUS.
- aa.* Head, front lobe of pronotum and scutellum black or dull brown; fourth antennal without pale ring; front femora in part piceous. 329. PLEBEJUS.

328 (527). *HERÆUS TRIGUTTATUS* (Guerin), 1857, 400.

Elongate, subparallel. Above reddish-brown; corium with apex black and a vague fuscous cross-bar at apical third, behind which is a distinct yellowish spot; membrane black; antennæ pale reddish-brown, the fourth joint fuscous at base and apex; under surface reddish-brown, the last three ventrals darker. Joint 1 of antennæ exceeding tylus by one-third its length. Head very finely and densely strigose-punctate. Scutellum and hind lobe of pronotum rather sparsely, coarsely and irregu-

larly punctate, the former with an obtuse V-shape ridge smooth. Clavus and corium with regular rows of punctures, the latter with numerous others on apical half. Length, 7—8 mm.

Royal Palm Park, Fla., March 16; two specimens beaten from dead leaves of royal palm lying in a pathway of the dense hammock on Paradise Key. Described from Cuba. Taken in Florida heretofore only at Biscayne Bay.

329 (528). *HERÆUS PLEBEJUS* Stal, 1874, 147.

Narrowly elongate; thinly clothed with short, yellowish pubescence. Head, front lobe of pronotum, scutellum and under surface dull brownish- or blackish-piceous; hind lobe of pronotum and elytra dark reddish-brown, their margins and tip of scutellum paler; disk of corium with some vague yellowish spots near hind margin, its apex fuscous; membrane brown, its nerves paler; antennæ reddish-brown, the fourth joint and apex of third darker; front femora reddish-brown to piceous, middle and hind femora and all tibiæ pale yellow, the femora with a dark subapical ring. Scutellum and hind lobe of pronotum sparsely and finely punctate, the former with an obtuse median smooth line. Corium and clavus with more or less regular rows of punctures. Other characters as in generic description. Length, 4.5—5.5 mm. (Fig. 84).

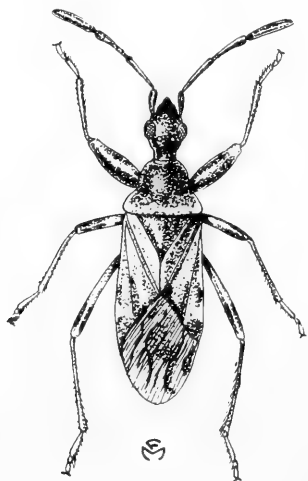


Fig. 84, X 8. (Original).

Marion, Vigo, Posey and Perry counties, Ind., April 10—Oct. 13. Dunedin and R. P. Park, Fla., March 15—Sept. 1 (*H. S. B.*). Sherborn, Mass., Oct. 18 (*Frost*). Scarce in Indiana, where it occurs beneath stones and rubbish and is occasionally swept from foliage, especially sumac. Single specimens were taken at Dunedin at porch light on each of the dates mentioned, and numerous others in the winter by beating Spanish moss and the dead leaves of cabbage palmetto. The only other Florida records are Sanford and Everglade, April. Ranges from Massachusetts west to southern Indiana and Kansas and southwest to Florida, Texas and Arizona. Van Duzee found it near Buffalo, N. Y., "concealed in moss in January," so that in the north it probably hibernates as imago. One of the Indiana specimens was once named by Uhler as *Heraeus orbicollis* Uhler.

III. SPHÆROBIUS Uhler, 1893, 710.

Elongate, moderately slender species having the head broader across the eyes than front lobe of pronotum and without distinct neck; beak reaching middle coxæ; pronotum as in key, the transverse constriction deep; elytra (brachypterous) reaching middle of fourth or fifth dorsal; front femora much swollen and armed beneath on inner side with a number of short teeth; hind tibiæ with rigid bristles; basal joint of hind tarsi nearly three times as long as the others united. Three species are known, two occurring in our territory.

KEY TO SPECIES OF SPHÆROBIUS.

- a.* Head and front lobe of pronotum with erect bristly hairs; third and fourth joints of antennæ subequal in length; corium without dull white striæ; smaller, length 5—6 mm. 330. INSIGNIS.
- aa.* Head and pronotum without erect hairs; fourth antennal one-fourth longer than third; corium with four dull white striæ diverging from base and reaching to beyond middle; larger, length, 7.5—8 mm. 331. QUADRISTRIATUS.

330 (531). SPHÆROBIUS INSIGNIS (Uhler), 1872, 407.

Head and front lobe of pronotum shining black; hind lobe of pronotum, scutellum, a large subquadrate spot behind middle and apex of corium piceous-black; base of corium and a transverse spot at apical fourth dull white; antennæ reddish-brown, the fourth joint and apex of third blackish; under surface shining black, thickly clothed with minute prostrate yellowish-gray pubescence; hind margin of metapleura white; femora piceous, tibiæ and tarsi paler. Hind lobe of pronotum sparsely and finely punctate, strongly declivent to the deep constriction. Scutellum similarly punctate, nearly one-half longer than wide at base. Other characters as above given. Length, 5—6 mm.

Georgetown, Colo., July 27 (*Gerhard*). Uhler's types were from "Utah, Colorado, Canada and Minnesota," but it occurs also in Maine and New Hampshire though not known in our territory west of these two states. According to Uhler, specimens "occasionally occur with chestnut-red pronotum," and in macropterous forms the elytra are somewhat longer than abdomen.

331 (532). SPHÆROBIUS QUADRISTRIATUS Barber, 1911a, 24.

Head and front lobe of pronotum shining, impunctate; scutellum, membrane except tip and sterna beneath dully sooty black; hind lobe of pronotum, ventral surface of abdomen and legs dark brown, the bases of femora and tarsi paler; corium dark brown with four whitish rays as mentioned in key and a prominent white triangular spot near apex; an-

tennæ reddish-brown, the fourth joint and apex of third darker. Hind lobe of pronotum about one-third the length and but slightly wider than front one, its disk finely and rather closely punctate. Scutellum with apical half finely transversely rugose, punctate at sides, vaguely carinate. Elytra reaching middle of fifth dorsal. Length, 7.5 mm.

Lakehurst, N. J., July 4 (*Barber*). Described from there and recorded elsewhere only from Quebec. Beaten from small pines, which were partly scorched from fire.

IV. LIGYROCORIS Stal, 1872b, 51.

Elongate, rather robust species having the head porrect, wider across eyes than front lobe of pronotum and without distinct neck behind; beak reaching middle coxæ, its first joint not reaching base of head, third nearly twice the length of fourth; bucculæ very short, not reaching base of antennæ, sometimes wanting; antennæ (in our eastern species) with basal joint surpassing tip of tylus, fully or nearly as long as basal joint of beak, third and fourth almost subequal in length, second longest; pronotum with front lobe narrower and less than twice the length of hind one; scutellum usually much longer than wide at base; elytra as wide as abdomen; connexivum not exposed; front femora swollen and armed beneath, usually on inner side only, with a few teeth of unequal length; basal segment of hind tarsi usually more than twice the length of others united; second and third ventrals strigose as stated in key.

In old or greasy specimens the primary character of a "denuded densely and very delicately strigose vitta" each side of second and third ventrals (fig. 70), is often very difficult to see. In clean fresh ones it is plainly visible. More than twenty species are known, eight of which occur in the eastern states.

KEY TO EASTERN SPECIES OF LIGYROCORIS.

- a. Corium without a transverse dark bar behind the middle, its narrow costal margin wholly pale.
- b. Ventral lunate strigose area much obscured by a coating of fine hairs; front and hind lobes of pronotum of nearly equal width; outer basal angle and basal veins of membrane pale.
- 332. OBSCURUS.
- bb. Ventral strigose area not obscured by hairs; hind lobe of pronotum wider than front one; membrane either streaked through the middle or much mottled with pale.
- c. Front lobe of pronotum with few or no erect hairs, distinctly

longer than hind lobe; membrane broadly streaked with pale through the middle; second antennal nearly three times the length of first. 333. *DEPICTUS*.

- cc.* Front lobe of pronotum with scattered erect hairs, exclusive of collar only slightly longer than hind lobe; membrane spotted with pale; second antennal about twice the length of first.

334. *LITIGIOSUS*.

- aa.* Corium with a transverse dark bar just behind the middle which interrupts in part or wholly the pale costal margin.

- d.* Fourth joint of antennæ with broad pale ring at base.

- e.* Front femora with only the inner edge of lower surface armed; second joint of antennæ more than twice the length of first one; basal joint of hind tarsus more than twice as long as others united; dark bar of corium with outer end not reaching costal margin. 335. *ABDOMINALIS*.

- ee.* Front femora with inner edge armed with spines and outer one apically with a few small teeth; second joint of antennæ scarcely twice the length of first; basal joint of hind tarsus not twice as long as others united; dark bar of corium with outer end truncate and reaching costal margin.

336. *MULTISPINUS*.

- dd.* Fourth joint of antennæ without a pale ring at base.

- f.* Head above and below dull red; membrane entirely fuscous; front lobe of pronotum impunctate and without erect hairs.

337. *SLOSSONI*.

- ff.* Head wholly fuscous; membrane with at least the basal veins pale; front lobe of pronotum with scattered punctures bearing erect hairs.

- g.* Front lobe of pronotum and fore femora with but few erect hairs; dark markings of corium fuscous or piceous, the outer end of transverse bar reaching costal margin; membrane with distinct pale spot at apex. 338. *SYLVESTRIS*.

- gg.* Front lobe of pronotum and fore femora with numerous scattered erect hairs; markings of corium dark reddish- or chestnut-brown, the end of transverse bar not reaching costal margin; membrane with veins only mostly pale. 339. *DIFFUSUS*.

332 (—). *LIGYROCORIS OBSCURUS* Barber, 1921a, 102.

Elongate-oval, rather robust. Head, front lobe of pronotum and under surface dull black; upper surface of head and ventral one of abdomen densely clothed with short prostrate yellow pubescence; basal lobe of pronotum in great part, scutellum and elytra fuscous, tinged with reddish-brown; basal angles of pronotum, tip of scutellum, a small spot near apex of commissure and entire costal margin of corium, pale yellow; antennæ pale yellow, the fourth joint, apex of third and extreme base of first fuscous; legs dull yellow, the femora with apical third or more in part fuscous. Head and pronotum with scattered erect hairs. Pronotum with front lobe subglobose, impunctate, slightly wider than long; hind lobe transverse, subdepressed, finely irregularly punctate. Scutellum punctate along the sides, obtusely keeled toward apex. Front

femora armed on outer edge beneath with three spines and some small teeth, on inner one with several minute subapical teeth. Hind tibiæ with numerous erect spines. Length, 7.5—8.5 mm.

Marion and Vigo counties, Ind., Aug. 12—Sept. 28. Swept from flowers of white snake-root, *Eupatorium ageratoides* L., and other Compositæ along the wooded slopes of streams. Described from Maryland, Illinois and Kansas. Of it Barber says: "Very similar in appearance to *Zeridoneus costalis* (Van D.), but the latter without lunate strigose vittæ and with basal joint of antennæ fuscous and posterior lobe of pronotum with two or three median longitudinal paler streaks."

333 (—). *LIGYROCORIS DEPICTUS* Barber, 1921a, 109.

Elongate-oval. Head, front lobe of pronotum, scutellum and under surface dull black, the head and ventral surface of abdomen thickly clothed with prostrate yellow hairs; hind lobe of pronotum and corium in great part dark reddish-brown, the former with the nodulose hind angles, the latter with a vague spot near inner apical angle and the entire costal margin, straw-yellow; antennæ with fourth joint and apical half of third dark brown, remainder pale reddish-brown; legs and hind margin of metapleura pale brownish-yellow. Third and fourth antennals subequal, second one-third longer than either. Front lobe of pronotum subcylindrical, nearly twice as long and but slightly narrower than hind one, the latter finely and rather sparsely punctate. Elytra usually slightly shorter than abdomen. Length, 5—6 mm.

Bear Swamp, Ramapo Mts., N. J., July 25 (*Barber*). Known only from New Jersey, Massachusetts and Connecticut. Resembles very closely *L. diffusus* (Uhl.), but front lobe of pronotum longer, more cylindrical and devoid of erect hairs, antennal segments longer and elytra without a postmedian transverse dark bar.

334 (539). *LIGYROCORIS LITIGIOSUS* (Stal), 1862, 313.

Elongate-oblong, sides subparallel. Head, except tylus, front lobe of pronotum, scutellum and under surface blackish-brown; collar of front lobe and margins and three narrow stripes on hind lobe of pronotum, dull yellow; corium dull yellow punctate with fuscous, the costal margin and an oblique bar in front of apical margin straw-yellow; membrane brown with numerous small vague pale spots; legs and antennæ pale dull yellow, the fourth antennal and apical fifth of hind femora darker. Structural characters as in *diffusus*, the erect hairs of pronotum fewer. Length, 5—6.2 mm.

Royal Palm Park, Fla., Dec. 12—14; two specimens taken beneath boards along the margins of the everglades (*H. S. B.*). Huachaca Mts., Arizona, July 10 (*Barber*). A neotropical

species described from Mexico and taken by Mrs. Slosson at Biscayne Bay, Fla. Resembles *diffusus*, very closely but differs in its smaller, more parallel form, pale collar, more evident pale stripes of hind lobe of pronotum and lack of postmedian cross-bar of elytra.

335 (540). *LIGYROCORIS ABDOMINALIS* (Guerin), 1857, 397.

Elongate, robust. Head, front lobe of pronotum, scutellum and under surface dull black, more or less clothed with fine appressed yellowish pubescence, all except under surface and also the front femora bearing numerous long, erect brownish hairs; hind lobe of pronotum piceous, with usually the hind angles and three short stripes on middle paler; corium in great part piceous-brown, its costal margin to transverse dark bar and a small spot opposite apex of clavus, pale yellow; membrane fuscous, with a small pale spot near tip of corium; antennæ with first joint, usually the tips of second and third and apical half or more of fourth, fuscous, remainder pale yellow; legs pale yellow, the greater part of fore femora and apical fourth of the others, except knees, black. Pronotum with front lobe subglobose, distinctly narrower and but little longer than hind one, the latter sparsely irregularly punctate. Scutellum much longer than wide, disk punctate along the sides and near base, a vague median transverse elevation and apical longitudinal keel smooth. Front femora with lower inner edge armed with two long teeth and several smaller ones between and in front of them. Length, 7—8 mm.

Dunedin, Fla., Dec. 1—April 3. Frequent on both islands and mainland; on the former taken from between the leaf-axils and stems of a tall thistle; on the latter by sweeping in open pine woods and especially by beating dead leaves of cabbage palmetto along the edges of gardens. A species of southern range, described from Cuba and previously recorded from Ft. Myers, Biscayne Bay and Lake Worth, Fla. Known also from Texas, Mexico, Venezuela and Brazil. The elytra in my specimens are mainly fuscous, not "pale stramineous yellow" as described by Barber (1921a, 110). The end of the dark transverse fascia across them is oval or rounded in outline and does not attain the extreme edge of costal margin.

336 (541). *LIGYROCORIS MULTISPINUS* Stal, 1874, 145.

Shorter and narrower than *abdominalis*. Color paler, the head, front lobe of pronotum and sterna brownish-piceous; hind lobe of pronotum, scutellum, elytra and ventral surface of abdomen reddish-brown; corium with two small spots near hind margin, and the costal margin in great part, pale yellow; membrane brown, the margin and some of the veins pale; legs pale yellow, femora dotted with brown. Head and pronotum with numerous erect reddish-brown hairs. Fourth joint of

antennæ one-fourth longer than third, almost as long as second. Other characters as in key. Length, 6—7 mm.

Dunedin, Fla., Sept. 1; taken at porch light. Recorded from Sanford by Van Duzee and from Everglade and Ft. Myers by Barber, the latter's *L. confraternus* being a synonym. Described by Stal from Mexico, and ranges from southern Florida south to Venezuela and Argentina.

337 (535). *LIGYROCORIS SLOSSONI* Barber, 1914, 513; 1924b, 135.

Elongate, slender, subparallel. Head, dull red; front lobe of pronotum (except collar), scutellum, transverse bar of elytra and under surface dark chestnut- to blackish-brown; collar and hind lobe of pronotum, femora and basal portion of antennæ reddish-brown; corium dull yellow with fuscous dots, the costal margin to transverse dark bar and a triangular spot near apex straw-yellow; legs reddish-brown, the tibiæ somewhat paler; fourth antennal and apical half of third fuscous. Second and fourth antennals subequal, third a little shorter. Pronotum with front lobe impunctate and without setæ, exclusive of collar, but slightly longer and distinctly narrower than hind one, the constriction between the two very strong; hind lobe rather coarsely, sparsely and very unevenly punctate. Scutellum with only one row of punctures each side of apical half, its median carina subobsolete. Length, 5—6.5 mm.

Dunedin, Fla., Feb. 14; a single female taken by beating dead leaves of oak near the bay beach. Known otherwise only from the unique male type taken by Mrs. Slosson at Lake Worth, Fla.

338 (537). *LIGYROCORIS SYLVESTRIS* (Linnæus), 1758, 449.

Elongate, slender. Head, front lobe of pronotum and scutellum dull black or piceous and bearing a few short stiff erect hairs; basal lobe of pronotum, clavus, transverse bar across corium and apex of the latter reddish-brown to fuscous; costal margin of corium pale yellow, broadly and completely interrupted by the dark transverse bar; membrane dark brown, a spot at apex and the veins at base pale; antennæ pale yellow, the fourth joint and apex of third fuscous; under surface piceous-black, the abdomen densely clothed with fine short grayish-yellow pubescence; legs pale yellow, the femora often in part darker. Pronotum with front lobe subcylindrical, nearly twice as long and but slightly narrower than hind one, the diameter at collar subequal to that of constriction between the two lobes; hind lobe sparsely and finely punctate. Membrane about reaching apex of abdomen, male; to middle of sixth dorsal, female. Length, 4.7—5.5 mm.

Vigo and Crawford counties, Ind., July 1—Aug. 30 (*H. S. B.*). Willow Springs and Palos Park, Ill., July 4—Aug. 21 (*Gerhard*). Not taken, but doubtless occurs, in northern Indiana. The single Vigo County specimen was found on the ground be-

neath a maple tree and was covered with plant lice, while the one from Crawford County was swept from goldenrod. It is an Old World species of northern distribution, occurring in this country from Quebec and New England west to North Dakota and Vancouver and south to New Jersey, where it is scarce. Recorded also from New Mexico. According to Barber (1921a, 113) the *Pamera contracta* Say (I, 332) is a synonym of *sylvestris*. It was first so placed by Stal (1874, 145), who also made the next species, *diffusus* Uhl., a synonym of *sylvestris*. In these conclusions he was followed by Uhler, Horvath and other authors, but not by Van Duzee, who, in his Catalogue, retains both *contractus* and *diffusus* as distinct. This confusion in synonymy makes it impossible to fix by previous records an accurate limit to the distribution of either species.

339 (538). *LIGYROCORIS DIFFUSUS* (Uhler), 1871, 101.

Elongate-oval; averaging larger and more robust than *sylvestris*. Color much as there, but the elytra a paler reddish-brown, with the transverse dark bar less clearly defined, its ends not reaching the edge of costal margin of corium; hind lobe of pronotum with hind angles and often three vague stripes on disk, pale; corium with a small pale spot near its inner apical angle; membrane pale brown with veins and some vague markings on sides paler; legs pale reddish brown, the tips of hind femora usually darker. Pronotum with front lobe much less than twice the length and distinctly narrower than hind one, the diameter at collar plainly less than that of constriction between the lobes; hind lobe and scutellum finely and sparsely punctate. Membrane reaching or slightly surpassing tip of abdomen in both sexes. Length, 5.2—7 mm. (Fig. 69).

Frequent in the northern half of Indiana, not taken south of Marion and Vigo counties; June 5—Oct. 1. Taken by sweeping tall grasses and other herbage along the margins of wet meadows and marshes. Ranges from Quebec and New England west to North Dakota and Colorado, and southwest to North Carolina, Arizona and California. The majority of the records, even by Uhler himself, have been made under the name of *L. sylvestris* L., treated above. The two species are very similar in general facies, but can be readily separated by the key and descriptions as given above.

V. *ORTHÆA* Dallas, 1852, 580.

Small, elongate or oblong, slender species, having the head porrect or nearly so, broader across the eyes than front mar-

gin of pronotum; antennæ slender, longer than head and pronotum united, basal joint shortest, surpassing tip of tylus, second more slender, slightly longer than the others; beak reaching middle coxæ, its first joint not reaching base of head; pronotum strongly constricted, front lobe subcylindrical, longer than hind one, scarcely longer than wide, its collar distinct; scutellum usually elongate-triangular, its apex acute; elytra as wide as abdomen, usually entire and reaching or slightly surpassing its tip, costal margin straight, feebly reflexed; front femora strongly swollen, armed beneath with one or two rows of spines or teeth; tarsi with basal joint about twice as long as the others united.

Our species of the genus have been mostly treated under the name *Pamra* Say, which Van Duzee (1914, 382) showed was preoccupied. Except in its members being narrower, less robust, and lacking the strigose areas of ventrals, the genus scarcely differs from *Ligyrocoris*. Ten species have in the past been presumably recorded from our territory, but two of them, *vicina* (Dall.) and *dallasi* (Dist.), are at present unknown and are not included in the following key. Both were recorded by Dallas from "North America" without definite locality.

KEY TO EASTERN SPECIES OF ORTHLÆA.

- a. Corium with costal area, except at apex, wholly pale, not interrupted by a dark bar behind the middle.
- b. Corium without a conspicuous oval pale spot near inner apical angle; front lobe of pronotum about twice as long as hind one; head rather strongly exerted; form very elongate; length 5.7 or more mm. (Subgenus *Paromius* Fieb.). 340. LONGULUS.
- bb. Corium with a small but conspicuous oval pale spot near inner apical angle; front lobe of pronotum not over one and one-half times as long as hind one; head much less exerted; form much less elongate; length less than 5 mm. (Subgenus *Orthæa* Dall.).
- c. Hind margin of corium wholly black or piceous; femora wholly pale. 341. VINCTA.
- cc. Hind margin of corium pale; femora, at least the hind ones, with dark markings.
- d. Pronotum moderately constricted slightly behind the middle, the front lobe with sides but slightly curved, convergent; front femora pale, hind ones with a preapical dark ring. 342. FRACTICOLLIS.
- dd. Pronotum sharply and strongly constricted well behind the middle, the sides of front lobe distinctly curved.
- e. Front lobe of pronotum transverse, widest at middle and with fine suberect pubescence; pale markings of upper surface indistinct or wanting; front femora reddish-brown.

343. LURIDA.

- ee.* Front lobe of pronotum more elongate, widest behind middle and with sparse subprostrate pubescence; pale markings of upper surface very distinct; front femora, except knees, piceous.
- f.* Hind lobe of pronotum finely, sparsely and evenly punctate, distinctly wider than front one; front tibiæ only slightly curved except near base. 344. BASALIS.
- ff.* Hind lobe of pronotum more coarsely, rugosely and unevenly punctate, scarcely wider than middle of front one; front tibiæ strongly curved throughout. 345. CURVIPES.
- aa.* Pale costal area of corium interrupted behind the middle by the ends of a fuscous or piceous cross-bar.
- g.* Fourth joint of antennæ wholly fuscous; general color dark reddish brown or fuscous; front of head evidently declivent. 346. BILOBATA.
- gg.* Fourth antennal pale at base; general color pale reddish-brown; head porrect. 347. SERVILLEI.

340 (546). *ORTHÆA LONGULUS* (Dallas), 1852, 578.

Elongate, very slender. Head, front lobe of pronotum, scutellum and under surface dull black or piceous, in fresh specimens thickly clothed with fine grayish-yellow appressed pubescence; basal lobe of pronotum reddish-brown with fuscous punctures, the hind angles paler; corium and clavus dull white with rows of reddish-brown or fuscous punctures, a triangular smooth pale area near inner apical angle; membrane whitish-hyaline; antennæ reddish-brown, the fourth joint and apex of third, fuscous; legs pale reddish-brown, the front femora and third joint of tarsi darker. Second and fourth antennals subequal in length, third slightly shorter. Pronotum with front lobe subcylindrical, impunctate, slightly longer than wide; hind one declivent to the obtuse constriction, finely, sparsely irregularly punctate. Scutellum with a row of punctures each side, its disk with a vague transverse submedian elevation, behind which is an obtuse longitudinal median keel. Front femora armed beneath with two rows of short irregular spines. Other characters as in key. Length, 5.7—6.8 mm.

Occurs throughout Florida; taken Oct. 25—April 26, at nearly all collecting stations, and recorded from numerous others. Agricultural College, Miss. (*Wcd*). Hibernates in bunches of Spanish moss, in crevices of dead leaves of cabbage palmetto and beneath rubbish on ground. In spring taken by sweeping weeds and grasses in moist soil. A neotropical species ranging from North Carolina to Florida and Texas. Occurs also in Mexico, South America and the West Indies. Usually listed as a *Paromius*, but Barber (1918, 76) has placed that genus as a subgenus of *Orthæa*. Dallas says that the thighs are black, but this is not true of Florida specimens.

341 (547). *ORTHÆA VINCTA* (Say), 1832, 16; I, 333.

Elongate-oblong. Color much as in *longulus*, the hind lobe of pronotum in great part darker; corium with hind margin rather widely black, and a conspicuous small oval white spot near inner apical angle; hind margin of metapleura white. Antennæ as in *longulus*, the apical joint only fuscous. Pronotum subglobose, front lobe exclusive of collar about one-third longer and much narrower than hind one, constriction very strong, hind lobe minutely sparsely punctate. Elytra sometimes abbreviated, reaching only to fifth dorsal. Front femora armed with several blackish spines and numerous minute teeth. Length, 2.8—3.3 mm.

Dunedin, Palmdale, R. P. Park and Ft. Myers, Fla., Nov. 24—April 22. Frequent about Dunedin, especially in or about wet hammocks and margins of ponds. Hibernates in dense masses of the climbing milkweed, *Metastelma scoparium* Michx., and other vines, and in spring taken by sweeping ferns and other vegetation in the hammocks. Recorded from numerous other stations in Florida and doubtless occurs throughout the State. Our smallest member of the genus, ranging from North Carolina to Texas; also known from the tropical regions of the Old and New Worlds and the Pacific Islands. The *Rhyparochromus parvulus* Dall. (1852, 576) is a synonym. Uhler (1876, 310) says that in Hayti "it occurs in small swarms upon low plants in damp spots and in gardens."

342. (—). *ORTHÆA FRACTICOLLIS* (Schilling), 1829, 82.

Elongate-oblong, subparallel. Head, front lobe of pronotum except collar, scutellum in great part and under surface dull black; hind lobe of pronotum clay-yellow, with three or four oblong dark blotches, its sides and hind angles pale yellow; scutellum with tip and a small spot on middle of sides yellow; elytra clay-yellow marked with fuscous punctures, middle of corium with a long vague brownish wedge-shaped spot; costal area pale yellow; membrane pale fuscous-brown, with margins and base translucent whitish; joints 1 and 4 of antennæ fuscous, 2 and 3 reddish-brown; legs dull yellow, the apical third of hind femora with a vague dark ring. Head minutely, densely and shallowly punctate. Pronotum with front lobe but little longer and slightly narrower than hind one, the latter finely and sparsely punctate, both lobes with sparse, fine, short yellowish hair. Basal half of scutellum with a median concavity, sparsely punctate and pubescent, apical half with a low median carina. Length, 4.7—5 mm.

Montreal, Canada, May 16 (*Barber*). A European species recorded in this country only from near Montreal.

343 (—). *ORTHÆA LURIDA* (Hahn), 1826, Fasc. I, No. 18.

Elongate-oblong, subparallel. Head, scutellum and sterna dark fuscous-brown, opaque; pronotum and ventrals dark reddish-brown, the

latter paler at sides; elytra clay-yellow with punctures fuscous, costal margin yellowish-hyaline, its tip and a vague oblique area on apical fourth of corium fuscous-brown; membrane fuscous-brown, veins paler. Antennæ reddish-brown, joint 4 darker. Upper surface, antennæ and femora rather thickly clothed with fine, suberect hairs. Pronotum subcampanulate, its front lobe almost smooth, narrower and one-half longer than hind one, the latter and also the scutellum sparsely rather finely punctate. Length, 4.2—4.5 mm.

Central Europe, September (*British Mus. Coll.*). A European species known in this country only from Montreal, Canada, where it was taken in May by J. I. Beaulne.

344 (554). *ORTHÆA BASALIS* (Dallas), 1852, 575.

Oblong-oval. Head, front lobe of pronotum, scutellum and under surface dull black, the head and ventral surface of abdomen thickly clothed with a minute yellowish-gray pubescence; hind lobe of pronotum usually paler at middle; corium and clavus dirty white, with rows of fuscous or brownish punctures, the corium with a small rounded white spot in inner apical angle; membrane pale brown, the veins whitish; antennæ reddish-brown, apical joint brownish-fuscous; front femora, except knees, shining black, apical fourth of middle and hind ones with a piceous ring. Pronotum with front lobe subglobose, stouter than in *vineta*, about one-half longer and slightly narrower than hind one, the constriction more obtuse, less deep than there; hind lobe and scutellum rather coarsely irregularly punctate, the latter with a low median keel toward apex. Front femora armed beneath with two rows of unequal teeth. Length, 3.8—4.2 mm.

Frequent throughout Indiana, more so in the southern portion, May 5—Dec. 8. Dunedin and R. P. Park, Fla., Jan. 18—April 5. Hibernates in Indiana beneath rubbish and stones along the borders of fields and roadsides, and in spring and summer taken by sweeping herbage in similar places. About Dunedin it is fairly common on both islands and mainland, hibernating in bunches of Spanish moss, in bases of tufts of grass, and beneath cover along the margins of ponds and in spring taken by sweeping herbage in damp soil. It is apparently much less common in Florida than either *vineta* or *bilobata*, having been recorded only from Lake City,⁵¹ Crescent City, Lakeland and Biscayne Bay. It is the only species of *Orthæa* of wide distribution in the northern states, ranging from Massachusetts and Connecticut, west to Michigan, Nebraska and Kansas and southwest to Florida and Texas. Uhler (1876,

⁵¹Quaintance (Bull. 42, p. 564, Florida Agr. Exp. Station) under the name of *P. vineta* Say, records *O. basalis* as injurious to strawberries at Lake City, and calls it "The Strawberry Pamera." His figure and notes under description show plainly that he had at hand *O. basalis*, not *vineta*.

310) states that: "It is common near Baltimore on the soils in the region of the metamorphic rocks; living in wheat and grass fields during spring and summer and hibernating beneath the rocks upon the arrival of cold weather."

345 (548). *ORTHÆA CURVIPES* (Stal), 1874, 148.

Very close to *basalis*; somewhat smaller and narrower. Color much the same, the hind lobe of pronotum distinctly paler than front one, more convex than in *basalis*. Other differences as in key. Length, 3.7—4 mm.

Dunedin and R. P. Park, Fla., Dec. 30—April 5; occurring with *basalis*; the first record for that State. Lake Pontchartrain, La. (*Davis*). Described from North Carolina and ranges from there to Texas, New Mexico and the West Indies. It is very probable that this will prove to be a synonym of *basalis*. Stal (1874, 152) evidently did not know either *basalis* or *vincta*, but knew *parvulus* (Dall.), a synonym of *vincta*. In his description of *curvipes* he compares it with *parvulus*. Now *basalis* has the front tibiæ more strongly curved than *vincta* and his description of *curvipes* agrees in all respects with *basalis*. However, until his type can be compared with *basalis*, it is better to retain his name for the form above described.

345 (549). *ORTHÆA BILOBATA* (Say), 1832, 17; I, 334.

Elongate, slender. Head, pronotum, scutellum and under surface dark reddish-brown to piceous, the hind lobe of pronotum usually with two or three vague blackish stripes, sometimes almost wholly dark with pale markings; corium and clavus dull white with fuscous punctures, the former usually with a stripe along claval suture, an angulate cross-bar behind middle and the tip fuscous or piceous; membrane pale brown, its apex rarely with a whitish spot; antennæ dull yellow, the apical joint wholly brown or fuscous; legs dull brownish-yellow, front femora sometimes tinged with piceous, tips of hind ones darker, apical joint of tarsi fuscous. Head in front of eyes very evidently declivent. Pronotum with front lobe subcylindrical, sides rounded, disk, exclusive of collar, about one-third longer and distinctly narrower than hind lobe, the latter sparsely, finely punctate. Scutellum with disk punctate along the sides, more sparsely so near base, the apical half with an obtuse smooth keel. Front femora armed beneath with two rows of small unequal teeth. Length, 4.8—5.3 mm.

Common throughout Florida; taken by me at almost all collecting stations and recorded from numerous others, Oct. 26—April 2. Hibernates in bunches of dead vines, bases of tufts of grass and beneath rubbish and taken both on islands and mainland by sweeping low herbage, usually in damp localities. A neotropical species described by Say from Louisiana and

Mexico and ranging from North Carolina to Texas, the West Indies and Argentina. The sterna are always dark, the abdomen often reddish-brown. In the paler specimens the dark transverse bar of corium often encloses a small triangular pale spot at inner apical angle.

347 (550). *ORTHÆA SERVILLEI* (Guerin), 1857, 399.

Differs from *bilobata* mainly by characters given in key. General color pale reddish-brown above and beneath; dark cross-bar of corium interrupted to form several oblong spots, the one on costal margin reaching its edge; membrane pale brown vaguely mottled with darker, the veins and an oblong spot at apex paler; front femora usually in great part brown or piceous, the knees paler; middle and hind ones with a dark preapical ring. Front lobe of pronotum slightly shorter and head more porrect than in *bilobata*. Length, 5—5.3 mm.

Dunedin, Moore Haven, R. P. Park and Lake Okeechobee, Fla., scarce, Dec. 10—April 6. Dunedin specimens were taken on the latter date by beating bunches of Spanish moss, the others by sweeping in low moist grounds. Taken at Crescent City, Fla., by Van Duzee. Described from Cuba and occurs also in Mexico.

VI. *ZERIDONEUS* Barber, 1918b, 45.

Elongate, slender species having the head porrect, the space between front of eyes and base of antennæ subequal to that behind eyes; antennæ almost nude, the basal joint exceeding tylus by one-third its length; first joint of beak almost reaching base of head, second longer than third; pronotum shallowly constricted just behind middle, its front lobe with distinct collar; scutellum much longer than wide, carinate throughout; front femora armed beneath with several unequal subapical teeth. Other characters as in generic key. One species is known.

348 (545). *ZERIDONEUS COSTALIS* (Van Duzee), 1909b, 373.

Elongate, slender, sides subparallel. Head, front lobe of pronotum, except collar, scutellum and under surface dull black, the head and ventrals thickly clothed with fine prostrate yellow hairs; hind lobe of pronotum with side margins and three discal stripes dull yellow; corium dark brown to blackish, punctate with fuscous, the entire costal margin and usually a small spot at inner apical angle straw-yellow; membrane dusky-brown, the veins paler; antennæ reddish-brown, the fourth joint, base of first and apical half of third fuscous; legs dull yellow, the apical half of front femora and tips of the others shining black or fuscous. Front lobe of pronotum subglobose, narrower and one-half longer than

hind one, the latter rather coarsely not densely punctate and with a vague median carina. Scutellum much longer than wide at base, sparsely punctate and with an entire median carina, this joined at middle on each side by an oblique obtuse one. Other characters as under generic key and heading. Length, 6.5—8 mm.

Marion Co., Ind., Sept. 15; one specimen swept from high weeds along the bank of a stream. Adirondack Mts., N. Y., Aug. 18 (*Barber*). Ranges from New England west to Manitoba and Indiana. Resembles *Ligyrocoris obscurus* very closely. For the distinctions see notes under that species.

VII. PERIGENES Distant, 1893, 396.

Elongate-oval, rather robust species having the head convex, wider across eyes than front margin of pronotum, deeply inserted in thorax, the anteocular space between antennæ and eye nearly twice the postocular one; beak slightly surpassing middle coxæ, first joint reaching base of head, second and third subequal, fourth shorter; antennæ with joints 2—4 furnished with erect hairs; pronotum subcampanulate, the constriction behind middle shallow, obtuse; scutellum subequilateral, obtusely keeled on apical half; costal margin of corium feebly curved behind middle; elytra covering the sides of abdomen, in females scarcely reaching its tip; front femora armed beneath with only two or three unequal preapical teeth. Other characters as in key. One of the two known species occurs in the eastern states.

349 (543). PERIGENES CONSTRICTUS (Say), 1832, 15; I, 332.

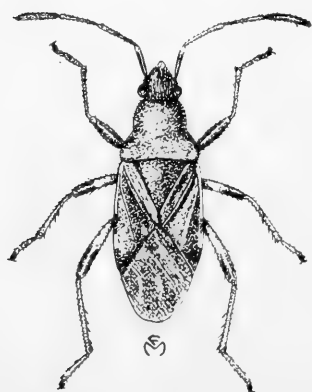


Fig. 85, X 4½. (Original).

Head, front lobe of pronotum, scutellum and under surface dull black, rather thickly clothed with fine appressed yellowish pubescence and bearing numerous erect stiff hairs; hind lobe of pronotum, clavus and disk of corium dark reddish-brown to piceous; costal margin of corium pale yellow, interrupted behind middle by an oblong projection of the dark disk; membrane dark brown or fuscous, with some vague paler markings; first joint of antennæ piceous, its tip paler, remaining joints reddish-brown, the fourth slightly darker; legs pale yellow, the front femora, except base and apex, and a preapical ring on middle and hind ones, shining piceous. Basal lobe of pronotum wider than and

about two-thirds the length of front one, its disk rather coarsely aciculate-punctate. Corium, clavus and sides of scutellum more or less thickly punctate. Other characters as above given. Length, 7.5—9 mm. (Fig. 85).

Lake, Vermilion, Marion, Vigo and Crawford counties, Ind., scarce, June 19—Nov. 30. Holland, Mich., June 10. Dunedin, Fla., Feb. 25—April 8. In Indiana it has been taken beneath logs in November; on herbage along streams and on mullein in sandy localities in June and July and beneath sphagnum moss in August. At Dunedin, the first record for that State, taken by beating dead leaves of cabbage palmetto and by sifting weed debris. Its general range is northern, extending from Ontario and New England west to South Dakota, Kansas and Colorado and south to District of Columbia and Florida. It was formerly much confused with *Ligyrocoris abdominalis* (Guer.) and *Zeridoneus costalis* (Van D.), so that many of the published locality records, especially the more southern ones, are wrong.

VIII. TOMOPELTA Uhler, 1893, 708.

Small robust, subopaque species having the head triangular, densely punctate, wider across eyes than front margin of pronotum, inserted in thorax to eyes; antennæ rather stout, longer than head and pronotum united, the joints pubescent and of nearly equal thickness throughout; beak reaching between the middle coxæ; front lobe of pronotum much wider than head, strongly convex, but slightly narrower and distinctly longer than hind one, its front and side margins bordered within by a row of coarse punctures; scutellum triangular, longer than wide, concave near base, the apical half with a distinct median carina; elytra coarsely punctate, the costal margins almost straight; membrane pale hyaline, surpassing abdomen. One species is known.

350 (—). TOMOPELTA MUNDA Uhler, 1893, 709.

Oblong, subglabrous. Head blackish, front lobe of pronotum, scutellum and under surface chestnut-brown; elytra and legs straw-yellow, the corium with a small submarginal spot at middle and the apex fuscous-brown; beak and antennæ reddish-brown, the terminal joint of latter usually paler. Joints 2 and 4 of antennæ subequal in length, 1 and 3 slightly shorter. Front lobe of pronotum rather strongly evenly transversely convex, but about one-third narrower and one-half longer than hind one, its sides finely margined and broadly rounded, the disk minutely densely punctate and with a preapical transverse row of coarse punctures; hind lobe with hind margin broadly shallowly concave, hind

angles feebly nodulose, disk more sparsely and coarsely punctate than front one. Scutellum with elevated basal portion triangular, very finely and densely punctate and with a vague median impression; apical portion coarsely punctate and with a distinct yellow longitudinal carina. Elytra entire, their side margins feebly sinuate, clavus with two regular rows, corium with several irregular rows, of distinct punctures. Under surface with pleura coarsely punctate, abdomen minutely densely punctate, very finely pubescent. Length, 2.5—3 mm.

R. P. Park, Fla., Dec. 5—March 29; numerous specimens taken by beating dead leaves of royal palm in the dense hammock on Paradise Key; others by sifting dead leaves from moist ground along roadways. Described from St. Vincent Island, the types taken "while flying at sunset in a forest in April, at an altitude of 1,000 feet." Not before recorded from the United States.

IX. PTOCHIOMERA Say, 1832, 18; I, 335.

Small oblong, rarely shining, species having the head wider than long, inserted in thorax to eyes; antennæ with joint one surpassing apex of head, three and four usually thicker than the others; beak reaching middle coxæ; pronotum as in key, the front lobe, especially in brachypterous forms, often twice or more the length of hind one; scutellum longer than wide, its base depressed, disk with a more or less evident premedian transverse subangulate elevation united behind to a median lengthwise carina; elytra as wide as abdomen, in macropterous forms reaching its tip; front femora armed beneath with several teeth, the front tibiæ of males sometimes with a preapical tooth; basal joint of hind tarsi subequal to the others united. Ten species are known from North America, six of which occur in the eastern states.

KEY TO EASTERN SPECIES OF PTOCHIOMERA.

- a. Front lobe of pronotum less than twice the length of hind one; fore tibiæ of males unarmed; antennæ devoid of stiff erect hairs. (Subgenus *Ptochiomera* Say).
- b. Third and fourth joints of antennæ suddenly much thickened.
- c. Front lobe of pronotum subcylindrical, much narrower and darker than hind one; carina of scutellum pale, very prominent.
- 351. NODOSA.
- cc. Front lobe of pronotum subquadrate, concolorous with and scarcely narrower than hind one; carina of scutellum feeble.
- 352. CLAVIGERA.
- bb. Third and fourth antennals gradually somewhat stouter, not suddenly so; carina of scutellum usually concolorous, obtuse.

- d. Second and third joints of antennæ not thickened, the second nearly three times as long as third. 353. MINIMA.
- dd. Second joint of antennæ less than twice as long as third, antennal joints gradually increasing in thickness from the base of second. 354. ANTENNATA.
- aa. Front lobe of pronotum twice or more the length of hind one; fore tibiæ of male armed with a distinct preapical tooth; joints 2—4 of antennæ furnished with stiff erect hairs. (Subgenus *Carpilis* Stal.).
- e. Second and third joints of antennæ distinctly more slender than fourth; pronotum (brachypterous form) with front lobe subglobose, its sides rounded, hind lobe wholly pale, its angles feebly nodulose above. 355. FERRUGINEA.
- ee. Third joint of antennæ and apical half of second as stout as fourth; pronotum (brachypterous form) with front lobe subcylindrical, its sides almost straight, hind lobe dark reddish-brown, its angles pale, strongly nodulose above. 356. BARBERI.

351 (557). *PTOCHIOMERA NODOSA* Say, 1832, 18; I, 335.

Oblong. Head, front lobe of pronotum, scutellum except carina, third joint of antennæ and basal half of fourth, dark brown or piceous; narrow front margin and hind lobe of pronotum and disk of corium and clavus dull straw-yellow marked with numerous fuscous punctures; membrane hyaline, its veins paler; first and second joints of antennæ, legs and beak, pale yellow; under surface dull yellow, the sides of abdomen usually darker. Antennæ with last two joints very stout, the fourth fusiform, slightly longer and more slender than third; second slender, subclavate, a little longer than third. Pronotum with front lobe one-half longer and distinctly narrower than hind one, its disk minutely, densely punctate; hind lobe with angles carinate, disk rather coarsely and evenly punctate. Scutellum with transverse ridge angulate, both it and carina prominent; disk otherwise finely densely punctate. Brachypterous forms with front lobe of pronotum relatively longer, membrane very short or obsolete, corium reaching base of fifth dorsal. Length, 3—3.5 mm. (Fig. 86).

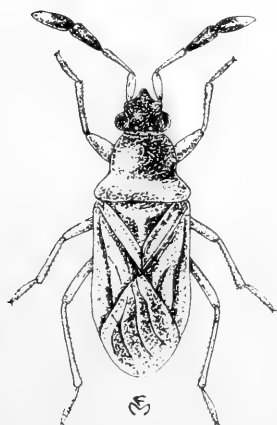


Fig. 86, X 12. (Original).

Frequent in the southern half of Indiana, much less so in the northern counties. Occurs throughout the year, hibernating beneath chunks and rubbish and in bases of tufts of grass along the margins of cultivated fields and roadsides, and in spring and summer taken by sweeping herbage along roadsides and in

moist open woods. Moore Haven, R. P. Park and Dunedin, Fla., Dec. 19—April 3. Frequent about Dunedin, hibernating beneath cover near water, the nymphs with the adults in February; in spring taken by sweeping around and over the sites of extinct ponds and by sifting the roots of tufts of grass. Recorded from several other Florida stations. Ranges from Massachusetts west to Missouri and southwest to Florida, Louisiana and Texas. Of it Uhler (1876, 308) says:

“In Maryland it is common beneath stones and is one of the first to become active in spring when the severe cold of winter is past. In autumn it may be met with beneath the stems of dried or drying plants and bushes which have dropped their leaves. The short-winged form is common in the granitic and primitive regions of the State, but it is generally full-winged in the newer and more southern portions of this region while farther south it is always (?) full-winged.”

In the latter statement he was wrong, as fully one-half of those at hand from Florida are brachypterous.

352 (558). *PTOCHIOMERA CLAVIGERA* Uhler, 1895, 24.

Oblong-oval. Above a nearly uniform dark reddish-brown, densely and coarsely punctate with fuscous, each puncture bearing a minute yellow scale-like hair; tip of scutellum and a few small scattered spots on corium dull yellow; costal margin pale at base, alternated with fuscous toward apex; antennæ with third joint and basal two-thirds of fourth piceous, remainder reddish-brown; under surface and femora dark reddish-brown, tibiæ and tarsi paler. Third antennal gradually widening from base to tip, much stouter than second; fourth conical, subequal in length to and slightly stouter than third. Pronotum with transverse constriction feeble, front lobe two-thirds longer than hind one. Scutellum with transverse ridge obtuse, carina very low. Elytra, brachypterous form, reaching base of fourth dorsal, the membrane wanting. Length, 2.5—2.8 mm.

Lakehurst, N. J., May 20 (*Barber*). Known also from Massachusetts, Connecticut and New York in the east, and Colorado, Kansas and Texas in the west, but not recorded from the intervening States. Occurs under boards and stones.

353 (561). *PTOCHIOMERA MINIMA* (Guerin), 1857, 398.

Oblong-oval. Head, front lobe of pronotum, scutellum and under surface dull fuscous-brown; hind lobe of pronotum, corium and clavus brownish-yellow, thickly dotted with fuscous punctures; membrane dark brown, the veins near base paler; antennæ reddish-brown, the fourth joint darker; femora dark brown, knees pale, beak, tibiæ and tarsi brownish-yellow. Antennæ slender, joint 1 stout, subclavate, 2 and 3 subequal in thickness, the second much the longest; 4 two-fifths longer than 3. Pronotum bell-shaped, front lobe finely punctate, about one-half

longer than hind one, the latter declivent to the obtuse constriction, hind angles nodulose, disk thickly rather coarsely punctate. Scutellum coarsely punctate and with a vague median carina on apical half. Length, 3.2—3.7 mm.

Chokoloskee and Moore Haven, Fla., March 1—June 1. Taken by sweeping low herbage in moist soil. Recorded by Barber from Titusville, Everglade, Miami and St. Augustine. Described from Cuba and known also from Texas.

354 (562). *PTOCHIOMERA ANTENNATA* Van Duzee, 1909, 172.

Form and color much as in *minima*. Hind lobe of pronotum with four or five short dark stripes; corium with apex and an interrupted transverse bar behind middle fuscous, the ends of the bar forming a dark spot on the pale costal margin; membrane fuscous, its veins pale; antennæ with basal joint fuscous-brown, remainder reddish-brown, the apical half of fourth paler; legs as in *minima*. Antennæ stout, but slightly longer than head and pronotum united, first, second and fourth joints subequal in length, third one-half shorter. Brachypterous form with front lobe of pronotum longer and wider, its sides more rounded than in macropterous one; membrane obsolete; corium reaching fifth dorsal. Length, 2.8—3 mm.

Dunedin and Key West, Fla., Jan. 1—April 19. Taken from beneath boards along the mucky margin of a pond, from bases of tufts of grass and by beating in a dense hammock. Van Duzee's unique female type was found running on a hot sand bank near Tampa, Fla. Known definitely elsewhere only from Miami, Fla., though Van Duzee doubtfully included an Arizona specimen with his type. Of the five specimens I have taken, four were brachypterous.

355 (570). *PTOCHIOMERA FERRUGINEA* (Stal), 1874, 153.

Oblong-oval. Head, front lobe of pronotum, scutellum and under surface dark reddish-brown; hind lobe of pronotum, corium and clavus straw-yellow dotted with reddish-brown punctures; membrane hyaline; antennæ reddish-brown, the fourth joint and apex of third piceous; legs and beak a uniform pale brownish-yellow. Antennæ rather stout, but little longer than head and pronotum united, first joint surpassing tip of tylus by half its length, second one-half longer than fourth, more than twice the length of third, fourth fusiform, stouter than the others. Macropterous form with pronotum bell-shaped, front lobe much narrower and twice the length of hind one, the latter with hind angles nodulose, disk rather densely, evenly, coarsely punctate. Scutellum punctate at sides and base; disk with a vague angulate median elevation, the apical lengthwise carina distinct. Membrane reaching tip of abdomen. Brachypterous form with pronotum as in key, its front lobe three times as long as hind one; membrane obsolete, corium reaching middle of fifth dorsal. Length, 2.8—3 mm.

Indian Lake, Sabael, N. Y., Aug. 4—8 (*Barber*). Known from Maine, New York, Texas and New Mexico. This is the *Carpilis ferruginea* of Stal, based upon the brachypterous form from Texas. Barber (1918b, 46) first described the macropterous form and placed it in the present genus.

356 (—). *PTOCHIOMERA BARBERI* Blatchley, 1924, 89.

Oblong-oval. Male with head, pronotum, base of scutellum and under surface dark reddish-brown; elytra, nodulose hind angles of pronotum and apical half of scutellum in part, pale brownish-yellow, their punctures but slightly darker; antennæ reddish-brown, the base of second joint paler; legs and beak pale yellow. Female with hind lobe of pronotum dull yellow with three brown stripes at middle and apical half of corium often with several oblong fuscous blotches. Antennæ relatively stout, as long as head and pronotum united; first joint stout, subcylindrical, exceeding tip of tylus by half its length; second subclavate, twice the length of fourth, three times that of third, the third joint and apical half of second as stout as fourth. Brachypterous form with pronotum subcylindrical, front lobe scarcely wider and three times as long as hind one, minutely punctate, its sides straight, very feebly converging from base to apex; hind lobe with hind angles strongly nodulose, rather coarsely rugosely punctate. Scutellum sparsely punctate, the preapical median carina very fine. Elytra obovate, the corium and clavus scarcely differentiated; membrane absent, corium reaching fifth dorsal, its hind margin obliquely truncate. Front femora strongly swollen, armed beneath with two rows of fine subequal teeth; front tibiæ of males strongly curved, armed beneath at apical fifth with an acute tooth. Length, 2.8—3 mm.

Dunedin, R. P. Park and Cape Sable, Fla., Dec. 30—March 22; taken at Dunedin from beneath boards on the bay beach and sifted from debris around the base of tufts of grass. In one of the females the right antenna is but 3-jointed, the usual short third joint being absent. Named in honor of H. G. Barber, of Roselle, N. J., our leading American authority on the Lygæidæ. The form of pronotum and antennal segments and the dark hue of hind lobe of pronotum in male easily distinguish this from *ferruginea* Stal.

These two species represent in the United States the genus *Carpilis* of Stal, erected in 1874 with *ferruginea* as the type. They differ from our other *Ptochiomera* in having the antennæ shorter with last three joints furnished with stiff erect hairs, in the toothed front tibiæ of males and in the front lobe of pronotum being more than twice the length of hind one. These characters are, in my opinion, of sufficient value to retain *Car-*

pilis at least as a subgenus instead of making it an absolute synonym of *Ptochiomera*, as has been done by Barber.

X. KOLONETRUS Barber, 1918c, 49.

Small oblong shining species having the head declivent, slightly wider across eyes than front margin of pronotum; antennæ slender, joints two and three subequal, fourth fusiform, slightly longer, but little stouter; pronotum oblong, rather closely punctate, strongly constricted at basal third, sides of front lobe feebly rounded, hind lobe with angles strongly nodulose above; scutellum longer than wide, thickly and coarsely punctate, its apical half with a vague median carina; corium thickly irregularly punctate; membrane never wholly absent, in macropterous forms reaching tip of abdomen; front femora swollen, armed with a single stout post-median tooth, male, with two smaller teeth, female; first joint of hind tarsus but slightly longer than the others united. Other characters as in generic key. One species is known.

357 (582½). KOLONETRUS PLENUS (Distant), 1882, 216.

Elongate-oblong. Head, pronotum, scutellum and under surface shining black, feebly bronzed; elytra dark reddish- or grayish-brown, clouded with fuscous behind the middle, the punctures each enclosing a short yellowish appressed hair; membrane fuscous, paler at base; antennæ reddish-brown, the fourth joint, apex of third and sometimes the entire first darker; femora dark reddish-brown to piceous, their knees and tibiæ paler. Structural characters as above given. Length, 3—3.4 mm.

Indian Lake, Sabael, N. Y., Aug. 5 (*Barber*). Described from Guatemala and known in the United States from Maine, New Hampshire, Massachusetts, Connecticut and Arizona. It is a terrestrial form which in New England occurs in July and August in beach drift and also beneath moss and dead leaves.

XI. CNEMODUS Herrich-Schaeffer, 1853, 184.

Elongate, rather robust species of medium size, having the head porrect, distinctly exserted, the space behind eye equal to that between antennæ and eye; ocelli absent; antennæ slender, more than half the length of body, basal joint exceeding apex of head by two-thirds its length, second longest, 3 and 4 subequal; pronotum as in generic key, front lobe in brachypterous form cask-shaped, convex, narrowed in front, usually wider at middle than hind one, the latter finely sparsely punctate; in macropterous form subcylindrical, distinctly narrower than the

inflated hind lobe; scutellum elongate-triangular, sparsely punctate; front femora elongate, moderately swollen, armed beneath with two rows of teeth, those in outer row the larger; front tibiæ of male curved at base, armed near middle with a strong tooth. Three species are known, two occurring in the eastern states.

KEY TO EASTERN SPECIES OF CNEMODUS.

- a. Femora and tibiæ not hirsute with long hairs, or the femora sometimes with a few scattered ones.
- b. Beak reaching middle coxæ; front lobe of pronotum at middle but little wider than hind one. 358. MAVORTIUS.
- bb. Beak reaching front coxæ; front lobe of pronotum at middle much wider than hind one. 358a. var. INFLATUS.
- aa. Femora and tibiæ all thickly hirsute with long erect hairs. 359. HIRTIPIES.

358 (566). *CNEMODUS MAVORTIUS* (Say), 1832, 19; I, 337.

Elongate. Black or piceous-black, the pronotum shining; elytra piceous, the costal margin slightly paler; antennæ reddish-brown, the fourth joint and apex of third brownish; legs pale brownish-yellow. Elytra dimorphic, membrane in brachypterous form not exceeding apex of corium, scarcely reaching fifth dorsal; in macropterous form larger, reaching tip of abdomen. Structural characters as above given. Length, 8—9 mm.

Frequent in southern Indiana, not taken north of Vigo County. Occurs throughout the year, hibernating in pairs beneath half buried logs in dense moist woodland, and in spring and summer found beneath dead leaves on wooded slopes of streams. Ranges from New England west to Missouri and southwest to Florida and Texas, the southern records probably to be referred to the two forms below described. Uhler records it as common in Maryland beneath stones and rubbish from March to November and states that it "varies much in the breadth of its outline, and has the hemelytra and wings of at least three dimensions."

358a (567). *CNEMODUS MAVORTIUS INFLATUS* Van Duzee, 1915, 109.

This appears to be only a variety of *mavortius*, as in specimens at hand the beak varies somewhat in length and the pronotum in width. There are no other structural differences than those mentioned in key.

Vigo Co., Ind., Sept. 29. Bigelow, Mo., Aug. 28 (*Barber*). Described from North Carolina and not elsewhere recorded.

359 (—). *CNEMODUS HIRTIPIES* Blatchley, 1924, 90.

Smaller and more slender than typical *mavortius*. Color the same,

except that the femora are tinged with fuscous. Hind lobe of pronotum with sides more thickened and disk more finely and sparsely punctate. Femora and tibiæ furnished with numerous long erect yellowish hairs. Length, 7—8 mm.

Ormond, Moore Haven, Sarasota and Dunedin, Fla., Dec. 6—April 6. Scarce about Dunedin beneath pine needles, in bases of tufts of grass and other cover, the macropterous form at porch light. Recorded also by Barber as *marvortius* from Jacksonville, Cleveland and Punta Gorda, Fla., and probably occurs sparingly throughout the State.

XII. PSEUDOCNEMODUS Barber, 1911a, 25.

Small elongate species closely allied to *Cnemodus* but having the head more porrect, less exserted, more rounded behind the eyes; ocelli present; pronotum shorter, its collar narrower, less defined, hind lobe wider; front femora less elongate, more swollen; males with middle femora armed beneath with several strong teeth, their fore tibiæ less curved near base with spine located on apical half. Other characters as in generic key. One species is known.

360 (569). PSEUDOCNEMODUS CANADENSIS (Provancher), 1886, 84.

Elongate, slender. Dark reddish-brown, shining; hind lobe of pronotum and elytra paler, the former with nodulose angles, the latter with costal margin, pale yellow, impunctate; antennæ reddish-brown, the fourth joint and apical half of third fuscous; legs straw-yellow, the apical half of fore femora darker. Antennæ slender, the basal joint exceeding tip of tylus by half its length; joints 2 and 4 subequal in length, third slightly shorter, thickened toward apex. Beak reaching middle coxæ, its first joint stout, scarcely reaching base of head. Pronotum with front lobe subcylindrical, more than twice as long as hind one, sides feebly rounded, disk finely sparsely punctate; hind lobe wider, its angles strongly nodulose above, disk thickly punctate. Scutellum elongate-triangular, closely punctate, its apical half distinctly carinate. Corium wider than abdomen, rather thickly punctate. Membrane, brachypterous form, very small, not passing apex of corium, reaching base of sixth dorsal. Length, 5.5—6 mm.

Falls City, Nebr., Aug. 30 (*Barber*). Ranges from Quebec and New England west to South Dakota and Vernon, B. C., and southwest to North Carolina. Barber (1911a, 26) redescribed it as *P. bruneri*, a synonym, from numerous specimens taken "from under old railroad ties which had been lying along a grassy embankment of the road for three or four weeks, beneath which the vegetation was not yet dead."

Tribe II. RHYPAROCHROMINI Stal, 1872b, 51.

This tribe, sufficiently characterized in the key, p. 385, comprises eight genera, six of which are represented in our territory.⁵²

KEY TO EASTERN GENERA OF RHYPAROCHROMINI.

- a. Front margin of pronotum with a distinct ring-like collar; head exserted, the postocular space usually subequal to that between eyes and base of antennæ; hind tibiæ with short, rigid bristles. I. OZOPHORA, p. 414.
- aa. Front margin of pronotum without a collar; head inserted in thorax to, or almost to, eyes; hind tibiæ without rigid bristles.
- b. Side margins of pronotum strongly carinate and reflexed; head short, wide, slightly exserted, suddenly and strongly contracted behind eyes; first joint of beak shorter than head; front tibiæ strongly curved. II. TEMPYRA, p. 419.
- bb. Side margins of pronotum very finely carinate, not reflexed or acute; head not at all exserted.
- c. Pronotum with disk of front lobe black, of hind one pale; scutellum with a V-shaped pale mark on apical half. III. PERITRECHUS, p. 419.
- cc. Pronotum with both lobes concolorous, usually reddish-or chestnut-brown and shining; scutellum without a V-shaped pale mark.
- d. Third ventral suture of abdomen straight and reaching the side margin; head across eyes distinctly narrower than front margin of pronotum. IV. PLINTHISUS, p. 420.
- dd. Third ventral suture curved forward before reaching side margin; head across eyes as wide as or wider than front margin of pronotum.
- e. Pronotum with both lobes very distinctly and closely punctate; scutellum longer than wide. V. STYGNOCORIS, p. 421.
- ee. Pronotum with disk of front lobe impunctate; scutellum equilateral; length less than 2.5 mm. VI. ANTILLOCORIS, p. 422.

I. OZOPHORA Uhler, 1871, 102.

Small elongate-oval species having the head porrect, wider across the eyes than front margin of pronotum; tylus decurved, not reaching middle of first joint of antennæ; eyes large, coarsely faceted; beak reaching hind coxæ or first ventral, first joint as long as head; antennæ slender, more than half the length of body, first joint stoutest, almost as long as head, second longest, third and fourth subequal in length, the third

⁵²Uhler in his Check List, p. 15, records *Pamphantus elegantulus* Stal (1874, 157), a Cuban species, from the "Southern States," but no other mention of its occurrence in this country can be found. As the genus is not included by Banks in his Catalogue, nor by Barber in his 1918 paper, it is here omitted.

thickened toward apex, fourth usually with basal third pale ringed; pronotum obtusely constricted in front of middle, sides sinuate opposite the constriction, their margins carinate and slightly reflexed; scutellum flat, elongate-triangular, without carina; elytra elongate, usually macropterous, sides subparallel, corium covering the abdomen; commissure of clavus as long as scutellum; membrane slightly surpassing tip of abdomen; front femora elongate, not strongly swollen, armed beneath with a single row of short, slender, preapical spines. Six of the seven known North American species occur in the eastern states.

KEY TO EASTERN SPECIES OF OZOPHORA.

- a. Femora without erect hair-like setæ; inner apical angle of corium with a small but prominent pale spot; general color not dark chestnut-brown.
- b. Basal third of last joint of antennæ dull white; corium with a dark cross-bar (often interrupted) behind middle; femora without brown dots.
- c. Upper surface glabrous or nearly so; hind lobe of pronotum paler than front one; cross-bar of corium chestnut-or reddish-brown, usually interrupted.
- d. Lateral margins of corium straight and parallel; hind lobe of pronotum not distinctly longer than front one.
- e. Pronotum wider at base than long, not strongly constricted near middle, its lateral carinæ distinct throughout; transverse convexity on front lobe of pronotum not interrupted at middle. 361. PICTURATA.
- ee. Pronotum not wider at base than long, strongly constricted near middle, its lateral carinæ very obtuse, evident only on basal half; transverse convexity on front lobe interrupted at middle. 362. REPERTA.
- dd. Lateral margins of corium evidently concavely sinuate; hind lobe of pronotum distinctly longer than front one. 363. CONCAVA.
- cc. Upper surface thinly but distinctly pubescent; hind lobe of pronotum in great part concolorous with front one; cross-bar of corium dark fuscous, not interrupted. 364. BURMEISTERI.
- bb. Last joint of antennæ wholly fuscous; corium without dark cross-bar; femora minutely dotted with brown. 365. PALLESCENS.
- aa. Femora furnished with numerous erect hair-like setæ; inner apical angle of corium without pale spot; general color dark chestnut-brown. 366. TRINOTATA.

361 (571). *OZOPHORA PICTURATA* Uhler, 1871, 102.

Elongate-oval. General color above dull straw-yellow; head, front lobe of pronotum and disk of scutellum usually blackish or dark brown; hind lobe of pronotum often with four vague dark stripes; corium with an elongate spot opposite apex of scutellum, a more or less interrupted

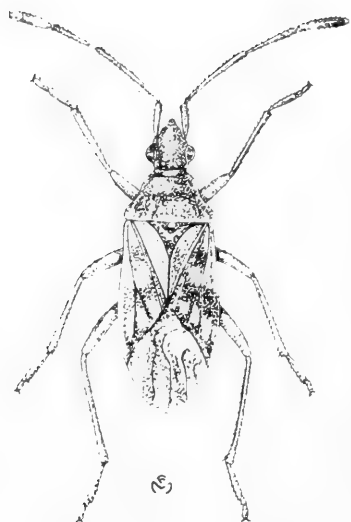


Fig. 87, X 6. (Original).

bar behind middle and the apex, fuscous, the costal area and a triangular spot near inner apical angle pale yellow; scutellum with an oblique stripe each side paler than the disk; membrane pale brown or fuscous, the apex and veins paler; antennæ pale reddish-brown, the tips of second and third joints and apical two-thirds of fourth fuscous-brown; under surface dark brown; legs dull yellow, the hind femora with a preapical dark ring. Front lobe of pronotum almost impunctate, its convex disk not interrupted; hind lobe, except nodulose angles, rather finely and evenly punctate. Scutellum thickly punctate, the pale line each side smooth. Length, 6—6.5 mm. (Fig. 87).

Occurs throughout Indiana, but scarce, April 8—Dec. 3. Hibernates beneath logs, and in spring and summer taken beneath cover in low marshy places, or swept from herbage in similar localities. Dunedin, Lakeland and R. P. Park, Fla., March 2—Sept. 1; taken at porch light on the latter date. Recorded from Biscayne Bay and Kissimmee, Fla., but apparently less common in that State than most of the species which follow. Uhler's type of *picturata* was from Cambridge, Mass., and its known range extends from New England west to Indiana and southwest to Florida, Texas and Arizona. He records it as "very rare near Baltimore, obtained from spots covered with rank growths late in July." Barber (1923, 731) says it is "frequently taken by sifting dead leaves in the late fall, or found sheltering under boards on the ground." It varies much in color, the head and pronotum being often as pale as the other parts of upper surface.

362 (—). *OZOPHORA REPERTA* sp. nov.

Form and color of *picturata*, but averaging smaller. Dark cross-bar of corium usually interrupted and in pale specimens almost obsolete. Pronotum very different, as noted in key, its front lobe much narrower, more subglobose, the transverse convexity divided to form two smooth oblique lozenge-shaped spaces; hind lobe more distinctly and deeply punctate. Costal margins of corium feebly sinuate at basal third. Front femora more slender than in *picturata*, the preapical spines blackish, much smaller and only two in number. Beak reaching second ventral. Length, 5—6 mm.

Royal Palm Park, Fla., March 20—April 4; six specimens swept from weeds along the margins of everglades. That this form is distinct from *picturata* is, on comparison, very evident. Specimens submitted to Barber were returned marked: "What Uhler identified as *O. consanguinea* Dist." However, the types of Distant's species from Mexico and Guatemala had the front lobe of pronotum "castaneous, not black," hind one with median dark stripe, sides much less constricted; front femora with four long slender spines; beak reaching only to middle coxæ and were 7 mm. in length, thus differing widely from the specimens in hand. Van Duzee (1917, 188) places *consanguinea* as a synonym of *picturata*.

363 (574). *OZOPHORA CONCAVA* (Distant), 1893, 394.

Elongate, feebly narrowed in front of middle of elytra. General color above fuscous-brown to blackish; collar and hind lobe of pronotum brownish-yellow, the latter with three or five fuscous stripes; scutellum blackish with a stripe each side and tip clay-yellow; margins of clavus and corium and veins and discal spots of latter, dull yellow; membrane fuscous, the veins paler; under surface fuscous, legs clay-yellow. Pronotum nearly twice as wide at base as apex, distinctly constricted in front of middle; hind lobe rather finely, evenly not closely punctate; elevations of front lobe and nodulose hind angles smooth; basal margin feebly concave. Length, 6—7 mm.

Arizona (*U. S. N. Mus.*); determined by Barber. Recorded from Florida, without definite station, by Van Duzee (1917, 189). A neotropical species described by Distant from Mexico, Guatemala and Panama.

364 (573). *OZOPHORA BURMEISTERI* (Guerin), 1857, 397.

Closely allied to *picturata*. Head, pronotum, disk of scutellum, dark bar across corium and under surface dark opaque fuscous, thinly clothed with fine gray inclined hairs; several small oblong spots on hind lobe of pronotum, smooth stripe each side of scutellum, a small spot at each inner apical angle and a large subquadrate one behind dark bar of corium, pale yellow; color otherwise as in *picturata*, the antennæ and legs somewhat paler. Pronotum slightly shorter and a little wider than in *picturata*, the transverse constriction less defined; hind lobe more sparsely and irregularly punctate. Length, 6—6.5 mm.

Everglade, Chokoloskee, R. P. Park and Lake Wales, Fla., March 11—April 14. Taken at the first two stations by beating the foliage of the mangrove, *Rhizophora mangle* L., along the edges of submaritime hammocks; at the others by sifting vegetable debris in moist places. Recorded also from St. Augustine, Fla. A neotropical species described from Cuba and known

in this country only from Florida and Texas. The pubescent upper surface and uninterrupted dark bar of corium, the ends of which reach the edge of costal margin, are characters easily separating this species from *picturata*.

365 (—). *OZOPHORA PALLESCENS* (Distant), 1893, 395.

Smaller and much paler than *picturata*. Head, front lobe of pronotum and sterna dark brown; hind lobe of pronotum usually with four to six alternating brown and yellow stripes, these often vague or, in the paler specimens, wanting; scutellum brown with a yellow spot each side; corium pale straw-yellow, its punctures reddish-brown, the extreme apex, an oblong spot in front of a small pale oval one at inner apical angle and a small spot opposite this on costal area, fuscous; antennæ pale brownish-yellow, the terminal joint wholly fuscous; femora minutely dotted with reddish-brown, the hind ones faintly annulate near apex; ventrals reddish-brown. Convex disk of front lobe of pronotum usually more or less interrupted and surrounded by numerous minute punctures. Length, 5.5—5.8 mm.

Dunedin, Fla., Dec. 18—March 25. I refer here a number of specimens taken about Dunedin, which differ from *picturata* in the characters described above. Distant's species is known from Jamaica, Trinidad and other West India islands, but has not before been recorded from Florida. The Dunedin specimens were taken from the leaf axils of a thistle on Hog Island, and by beating Spanish moss and sweeping ferns in dense hammocks on the mainland.

366 (572). *OZOPHORA TRINOTATA* Barber, 1914, 515.

Elongate-oblong. Above dark reddish- to chestnut-brown; some vague markings on hind lobe of pronotum, tip of scutellum, costal area of corium to behind middle, and a small spot on same area near apex, pale brownish-yellow; membrane dark brown; antennæ reddish-brown, the tip of third joint and apical two-thirds of fourth fuscous, basal third of fourth dull white; under surface fuscous-brown, finely pubescent; legs and beak dull brownish-yellow. Antennæ very slender, second joint reaching middle of scutellum, about one-half longer than third, the latter a little shorter than fourth. Pronotum with sides less sinuate than in *picturata*, the transverse constriction ill-defined, front lobe impunctate, hind one finely and rather densely punctate. Scutellum sparsely and finely punctate, its submargins smooth. Front femora not greatly swollen, armed beneath with three small preapical teeth. Length, 6—7 mm.

Dunedin and R. P. Park, Fla., Sept. 1—April 23. At Dunedin taken frequently at porch-light in April and September. Occurs in winter in small colonies beneath half buried logs in sandy places or in the bases of tufts of grass; in spring swept from ferns in dense hammocks. Described from Marco and Ever-

glade, Fla., and heretofore known only from coastwise stations in that State from Ormond southward. Very distinct from our other species by the characters given in key.

II. TEMPYRA Stal, 1874, 155.

Small oblong-oval species resembling superficially our species of *Blissus*, and having the antennæ short, stout, the first joint slightly surpassing apex of head, second twice the length of third, fourth fusiform, stouter than the others; pronotum subtrapezoidal, its transverse impression feeble; front lobe convex, side margins slightly sinuate near middle; beak reaching middle of mesosternum, its first joint subequal in length to first antennal. One species is known.

367 (576). TEMPYRA BIGUTTULA Stal, 1874, 157.

Oblong-oval. Head, pronotum, scutellum and under surface dull black or piceous; elytra reddish-brown, piceous toward apex, the corium with a prominent pale spot at middle of apical fourth; membrane fuscous, the apex paler; antennæ reddish-brown, the fourth joint and apex of third fuscous; legs dull yellow. Front lobe of pronotum finely and densely punctate, hind one more sparsely, more coarsely so. Scutellum scarcely as long as the commissure of clavus, thickly punctate and with a vague median carina on apical half. Other characters as under generic key and heading. Length, 3—3.2 mm.

Columbus, Tex., Aug. 28 (*Barber*). Plummer's Island, Md., hibernating beneath sycamore bark (*Barber*, 1914a, 170). No other records.

III. PERITRECHUS Fieber, 1861, 48, 153.

Small oblong-oval species having the head porrect, as wide as or wider across eyes than front margin of pronotum; beak reaching to or behind middle coxæ, its first joint to base of head; pronotum trapezoidal, sides straight, feebly converging from base to apex, disk without transverse constriction; scutellum much longer than wide, without median carina; elytra covering the abdomen, membrane reaching its tip; front femora moderately swollen, armed beneath with three or four large and several minute teeth. Three species are known, two occurring in the eastern states.

KEY TO EASTERN SPECIES OF PERITRECHUS.

- a. Width of pronotum just back of front angles subequal to that of head across eyes; third and fourth antennals subequal, second longest; smaller, length not over 5 mm. 368. FRATERNUS.

aa. Width of pronotum just back of front angles less than that across eyes; second and fourth antennals subequal, third shorter; larger 5.3—6 mm. 369. PALUDEMARI.

368 (585). PERITRECHUS FRATERNUS Uhler, 1871, 103.

Oblong-oval. Head, front lobe of pronotum, basal half or more of scutellum and under surface dull black, finely pubescent, the head with a brassy tinge; hind lobe of pronotum, V-shaped mark on scutellum and elytra dull brownish-yellow marked with fuscous punctures; membrane whitish-hyaline, vaguely clouded with fuscous; antennæ dark brown, the incisures paler; femora piceous, shining, knees paler; beak, tibiæ and tarsi reddish-brown. Antennæ with first joint short, stout, passing apex of head by half its length; fourth fusiform, but little stouter than third. Pronotum rather sparsely punctate, more coarsely so on pale basal portion; hind angles feebly nodulose above. Other characters as above. Length, 4.3—5 mm.

Vigo and Putnam counties, Ind., scarce, Feb. 4—July 11. Hibernates beneath chips and dead leaves in dry sandy localities, and in summer taken beneath stones and other cover. Ranges from Quebec and New England west to Colorado, Idaho and British Columbia. Recorded also from California and New Mexico, but in the east not taken south of New Jersey. Hussey (1922, 10) reports the taking of 30 on August 8 at a lighted sheet in a grassy yard at Devil's Lake, N. Dak.

369 (586). PERITRECHUS PALUDEMARI Barber, 1914, 516.

Elongate-oval, larger than *fraternus*. Color much as there, the corium and membrane more clouded with fuscous; femora often chestnut-brown with a preapical fuscous ring. Pronotum more convex, sides more strongly converging from base to apex, slightly sinuate near basal third. Front femora usually armed beneath at middle with a short tooth and with a second longer one at apical fourth. Other differences as in key. Length, 5.3—6 mm.

Royal Palm Park, Fla., Dec. 12 (*W. S. B.*); one adult and a nymph from beneath board on margin of everglades. Everglade, Fla., July (*Davis*). A subaritime species, usually inhabiting the edges of the salt marshes from Massachusetts and New York southwest to Florida, the only known specimens from the latter State being those above mentioned.

IV. PLINTHISUS Fieber, 1861, 46, 177.

Small oblong species having the head porrect, much narrower than pronotum, immersed in thorax to eyes; pronotum subquadrate, rather strongly constricted much behind middle, its front lobe convex, impunctate, side margins carinate; scutellum

equilateral without median carina; elytra covering sides of abdomen, usually brachypterous, the membrane in our single eastern species, small, reaching middle of fifth dorsal; front femora swollen, armed beneath with two small teeth.

370 (584). *PLINTHISUS COMPACTUS* (Uhler), 1904, 354.

Elongate-oblong, widest behind middle of abdomen. Head, front lobe of pronotum, scutellum and under surface dark chestnut-brown; hind lobe of pronotum, corium and clavus reddish-brown punctate with fuscous; membrane brownish-hyaline; antennæ piceous, the basal joint and part of third paler; beak and legs reddish-brown. Beak reaching middle coxæ. First joint of antennæ exceeding tip of tylus by one-half its length; second longest, subclavate, third and fourth subequal. Pronotum as in key, the front angles rounded. Scutellum finely punctate. Claval suture present. Costal margin of corium widened and reflexed to apical fourth. Front tibiæ of male strongly curved, its inner apical angle prolonged. Length, 3—3.5 mm.

Indian Lake, Sabael, N. Y., Aug. 11 (*Barber*). Described from New Mexico. Known from Ontario, New Hampshire, Massachusetts and New York. The *P. americanus* Van D. (1910, 75) is, according to Barber (1918d, 109), a synonym.

V. *STYGNOCORIS* Douglas & Scott, 1865, 213.

Small oblong-oval, densely punctate pubescent species, having the head wider across the eyes than front margin of pronotum; antennæ slender, first joint slightly surpassing apex of tylus, second longest, third and fourth subequal in length, the latter fusiform; beak reaching middle coxæ; pronotum with side margins narrowly carinate; clavus with four rows of punctures; fore femora unarmed. Two introduced palæarctic European species occur in our territory.

KEY TO EASTERN SPECIES OF *STYGNOCORIS*.

- | | |
|------------------------------------------------------|-------------------------|
| <i>a.</i> Femora piceous-brown; larger, 3—3.8 mm. | 371. <i>RUSTICUS</i> . |
| <i>aa.</i> Legs wholly pale; smaller, not over 3 mm. | 372. <i>PEDESTRIS</i> . |

371 (588). *STYGNOCORIS RUSTICUS* (Fallen), 1807, 70.

Oblong-oval. Above dull black, thickly clothed with subappressed yellow pubescence, costal area with edge paler; under surface black, more shining, more sparsely pubescent; antennæ reddish-brown, the apical joint fuscous; femora fuscous-brown, tibiæ and tarsi somewhat paler. Head and thorax densely, coarsely punctate, the latter with a vague median transverse impression. Scutellum and elytra more finely, less densely punctate. Brachypterous forms with membrane very short, reaching fifth dorsal. Length, 3—3.8 mm.

Oka, Quebec, Aug. 18 (*Barber*). Known in North America only from Quebec and Nova Scotia.

372 (—). *STYGNOCORIS PEDESTRIS* (Fallen), 1829, 64.

Oblong oval, above thickly clothed with suberect yellowish hairs. Head, thorax, scutellum and under surface piceous-black, shining; elytra reddish-brown; membrane fuscous, paler at base; antennæ brownish-yellow, the fourth joint piceous; legs pale brownish-yellow. Head and pronotum less densely punctate than in *rusticus*. Elytra entire, covering the abdomen. Length, 2.5—3 mm.

Elka Park, N. Y., Aug. 13 (*Barber*). Known in this country from Truro and Cape Breton, Nova Scotia, and from the mountainous regions of New York.

VI. *ANTILLOCORIS* Kirkaldy, 1904, 280.

Very small oval species having the head somewhat declivent, as wide across eyes as front margin of pronotum; beak reaching middle coxæ, its basal segment shorter than first antennal; joint 1 of antennæ as long as 2, exceeding tylus by half its length, 2 and 4 subequal in length, 3 shorter; pronotum trapezoidal, feebly constricted to form two lobes, front lobe in great part impunctate, its side margins finely carinate; scutellum equilateral, not carinate; elytra usually macropterous, covering sides of abdomen but scarcely reaching its tip, in brachypterous forms the membrane sometimes wholly absent; fore femora slightly swollen, unarmed. Three species are known from this country, two from the eastern states. They are the smallest of our Lygæidæ and were formerly recorded under the genus *Pygæus* Uhler (1894, 187), a preoccupied name.

KEY TO EASTERN SPECIES OF *ANTILLOCORIS*.

- a. Upper surface thickly pilose with long yellow hairs; membrane in brachypterous forms wholly absent. 373. *PILOSULUS*.
- aa. Upper surface thinly pilose with very short hairs; membrane always present. 374. *PALLIDUS*.

373 (578). *ANTILLOCORIS PILOSULUS* (Stal), 1874, 158.

Narrowly oval. Dark chestnut-brown, rather thickly pilose with long inclined yellowish hairs; antennæ dark reddish-brown; legs, sterna and apex of abdomen pale reddish-brown. Head shining, impunctate. Hind lobes of pronotum and scutellum minutely densely punctate. Corium reaching middle of fourth dorsal. Other characters as above described. Length, 1.8—2 mm.

Putnam and Posey counties, Ind., scarce, March 20—April 22. Taken from beneath stones on the slopes of hillside pas-

tures. Swannanoa, N. Car., March 5 (*Brimley*). Ranges from Massachusetts and New York west to Indiana and southwest to Florida and Texas, the only Florida record being that of Barber from Biscayne Bay. Bueno (1912, 212) took it at Yaphank, N. Y., by sweeping grasses in a dry cranberry bog. The Indiana specimens are all brachypterous and that seems to be the prevailing form. The long yellow hairs are best seen when viewed from the side.

374 (579). ANTILLOCORIS PALLIDUS (Uhler), 1894, 187.

Oblong-oval. Dark reddish-brown, head shining; basal third of pronotum and apical half of elytra often vaguely clouded with fuscous; membrane pale brown; first antennal and basal half of second reddish-brown, remainder fuscous; legs, sterna and often the apex of abdomen pale brownish-yellow. Pronotum shorter and wider than in *pilosulus*, the transverse constriction more evident, the hind lobe, apex of front one and scutellum rather coarsely punctate. Length, 1.8—2.2 mm.

Frequent throughout Indiana, March 20—Oct. 16. Taken by sifting the debris of rotten chunks along streams and by sweeping herbage in dense woodland. Dunedin, R. P. Park and Ft. Myers, Fla., Nov. 25—April 4. Common about Dunedin in winter beneath cover along the margins of ponds, and in spring taken by sweeping ferns and other vegetation in damp localities. Recorded also from Biscayne Bay. Uhler's types were from Grenada and its known range extends from Quebec and New England west to Indiana and south and southwest to Florida, Cuba and Texas. Barber (1923, 732) records it as a common species in New England "among dead leaves in damp situations."

Tribe III. BEOSINI Stal, 1872b, 54.

Small or medium sized depressed oval species possessing the characters given in the tribal key, and, in our eastern genera, having the head about as wide across the eyes as front margin of pronotum; antennæ slender, their basal segment short, at most exceeding apex of head by one-third its length; pronotum subquadrate, its side margins narrowly flattened, not reflexed, disk not constricted to form two lobes, its front margin without a depressed collar; scutellum not carinate. Four of the five genera recognized by Barber (1918, 82) occur in the eastern states.

KEY TO EASTERN GENERA OF BEOSINI.

- a. Upper surface opaque, not wholly black, the pronotum with either the narrow side margins or the hind lobe pale, punctate with black; front margin of pronotum almost straight.
- b. Antennæ sparsely pilose or almost nude; side margins of pronotum usually pale, but neither punctate nor furnished with setæ; basal segment of hind tarsus longer than the others united; scutellum without pale lines.
- c. Hind lobe of pronotum and corium pale, distinctly punctate with black; pronotum slightly narrowed in front, its side margins feebly rounded; antennæ pilose; front tibiæ of male distinctly curved at base. I. *TRAPEZONOTUS*, p. 424.
- cc. Hind lobe of pronotum black, not at all or finely and obsoletely punctate; pronotum less narrowed in front, its side margins pale, almost parallel; antennæ nearly nude; front tibiæ straight in both sexes. II. *MALEZONOTUS*, p. 425.
- bb. Antennæ furnished with numerous setose hairs; side margins of pronotum pale, provided with a few punctures set with long hairs; basal segment of hind tarsus subequal to the other two united; apical third of scutellum with a pale line each side. III. *SPHRAGISTICUS*, p. 426.
- aa. Upper surface more or less shining, wholly black; front margin of pronotum concave; third segment of beak shorter than second. IV. *APHANUS*, p. 427.

I. *TRAPEZONOTUS* Fieber, 1861, 50, 190.

Small oblong-oval species having the head short, declivent, slightly wider across eyes than front margin of pronotum; beak reaching middle coxæ, its first joint to base of head; elytra covering sides of abdomen, in brachypterous form reaching base of fifth ventral; front femora feebly swollen, armed beneath with one large and several small spines. Other characters as under tribal heading and in key. One species occurs in our territory.

375 (589). *TRAPEZONOTUS ARENARIUS* (Linnæus), 1758, 448.

Oblong-oval. Head, front lobe of pronotum, scutellum and under surface dull black, the abdomen shining; hind lobe of pronotum, corium and clavus dull yellow, rather thickly punctate with black or fuscous; narrow side margins of pronotum and corium pale dull yellow; membrane brown with pale veins; antennæ dark brown, the basal joint in great part pale; femora and first and second joints of beak dull yellow, remainder of beak, and tibiæ and tarsi dark brown, male; legs usually wholly dark brown, female. Antennæ with first joint slightly exceeding tip of tylus; second slender, subequal in length to fourth, third shorter. Scutellum broadly triangular, its disk and that of front lobe of pronotum finely and sparsely punctate. Ventral surface of abdomen sim-

ilarly punctate. Genital plate of male broadly rounded. Length, 4—5 mm.

Indian Lake, Sabael, N. Y., Aug. 20 (*Barber*). An introduced European palæarctic species known in this country only from the mountainous regions of Quebec, New England and New York.

II. MALEZONOTUS Barber, 1918c, 54.

Small oblong-oval species, differing from *Trapezonotus* mainly by characters given in key and having the first segment of antennæ barely exceeding tylus, second and fourth subequal, third shorter than either; pronotum with narrow side margins usually pale, not punctate or setose, hind margin broadly concave before the scutellum, which is flat, longer than wide, not at all or very finely punctate; clavus with three irregular rows of punctures; front femora swollen, armed beneath on apical half with two or three teeth; hind tibiæ with short rigid bristles. Four species are ascribed to the genus by Barber, *Trapezonotus rufipes* Stal forming the type. Two of these occur in the eastern states.

KEY TO EASTERN SPECIES OF MALEZONOTUS.

- a. Elytra in great part brownish-yellow; membrane fuscous, paler at base. 376. SODALICIUS.
- aa. Elytra, except outer margin, piceous; membrane wholly piceous-black. 377. FUSCOSUS.

376 (581). MALEZONOTUS SODALICIUS (Uhler), 1875, 835.

Oblong-oval. Head, disk of pronotum, scutellum and under surface dull black, sparsely clothed with a very short and fine yellow pubescence; base of clavus and a large subapical spot on corium dull black, side and hind margins of pronotum narrowly edged with straw-yellow; antennæ reddish-yellow, the fourth joint brown; legs pale brownish-yellow. Pronotum subquadrate, sides very feebly converging from base to near apex, then rounded; disk minutely densely granulate-punctate, nodulose above the hind angles. Elytra finely punctate, covering the abdomen and reaching its tip. Length, 4 mm.

Dilley, Ore., Aug. 20 (*Barber*). Seattle, Wash. (*U. S. Nat. Mus.*). Recorded from Virginia and Mississippi by Barber (1918c, 55), but its main distribution is west of the Rocky Mountains. Common in strawberry beds on Vancouver Island (*Parshley*, 1919, 17).

377 (—). MALEZONOTUS FUSCOSUS Barber, 1918c, 56.

Elongate-oval, sides sub-parallel. Color of the preceding but the

elytra piceous with costal margin and submargin pale; pronotum with only the narrow reflexed side margins pale; last two joints of antennæ piceous, basal joints and legs reddish-yellow. Pronotum as in *sodalicius*, disk of front lobe minutely granulate, of hind one finely punctate and near base finely transversely wrinkled or furrowed. Membrane in brachypterous forms reaching apex of fifth dorsal, in macropterous ones the tip of abdomen. Length, 3.5—4 mm.

Lakehurst, N. J., April 2 (*Barber*). Known only from New Jersey and New York, where it occurs in spring beneath leaves under huckleberry bushes and in the washup of the beaches.

III. SPHRAGISTICUS Stal, 1872b, 55.

Here belongs a single medium sized species having the head declivent, slightly wider across the eyes than front margin of pronotum; beak reaching middle coxæ; pronotum subtrapezoidal, its sides straight, feebly converging toward apex, their margins rather widely flattened; scutellum longer than wide; elytra usually entire, covering abdomen and reaching its tip; front femora armed beneath with a prominent preapical spine and two or three minute teeth; tibiæ provided with short, stiff bristles. Other characters as in generic key.

378 (592). SPHRAGISTICUS NEBULOSUS (Fallen), 1807, 65.



Fig. 88, X 7½.
(After Forbes).

Elongate-oval. Head, disk of front lobe of pronotum, scutellum in great part and under surface dull black; hind lobe of pronotum, two subapical spots on scutellum and elytra grayish-yellow, punctate with fuscous; membrane brownish-yellow, the veins paler; second and third joints of antennæ, tibiæ and tips of femora reddish-brown; first and fourth antennals, femora and some irregular spots on apical half of corium dark brown or piceous. Other characters as above. Length, 5—5.3 mm. (Fig. 88).

Taken in Indiana only in Vigo County, where it hibernates beneath rubbish along the borders of sandy fields, especially those in which melons have been cultivated; probably occurs in similar localities throughout the State. It is a European species, but ranges in this country from Ontario and New England west to the Pacific; recorded also from Texas, New Mexico and California. Hussey reports it as rather common near the sand dunes of Berrien Co., Mich. Easily known by the

row of erect setæ along the pale margin of pronotum and the two pale spots near apex of scutellum.

IV. APHANUS Laporte, 1832, 35.

Medium sized black species having the head declivent, wider across the eyes than long; beak reaching mesosternum; pronotum subquadrate, feebly convex, its basal margin concave; scutellum longer than commissure, as wide or wider at base than long; elytra entire, reaching tip of abdomen; front femora armed beneath with one large and two smaller spines. Three species are known from this country, two from the eastern states.

KEY TO EASTERN SPECIES OF APHANUS.

- a.* Legs, beak and antennæ wholly black or piceous; hind lobe of pronotum sparsely and finely punctate. 379. UMBROSUS.
- aa.* Legs, beak and antennæ in great part brownish-yellow; hind lobe of pronotum more closely and coarsely punctate. 380. ILLUMINATUS.

379 (594). APHANUS UMBROSUS (Distant), 1893, 409.

Elongate-ovate. Black, shining; antennæ and beak piceous, the incisures paler; membrane, coxæ, tibiæ and tarsi piceous; femora black. Hind lobe of pronotum, scutellum and corium sparsely, finely irregularly punctate; clavus with four rows of punctures, the two median rows confused. Length, 6—7 mm.

Southern half of Indiana, frequent; not taken in the northern counties. Occurs throughout the year, hibernating singly or in pairs beneath logs, chunks, leaves of mullein, etc., and taken in spring and summer by sweeping low herbage, more commonly in sandy localities. Ranges from Ontario and New England west to Colorado and Kansas and south to Florida, Texas, Arizona and California. In the Slosson collection from Florida without definite locality. Often recorded as *Microtoma carbonaria* Rossi=*M. atrata* Goez.

380 (—). APHANUS ILLUMINATUS (Distant), 1893, 409.

Elongate-oval. Black, feebly shining; membrane fuscous, the veins paler; beak and legs dull yellow; tibiæ sometimes in part fuscous. Head as wide across eyes as front margin of pronotum. Antennæ clay-yellow, joints 2 and 4 tinged with fuscous; 2 one-half longer than 3, 4 slightly longer than 3. Pronotum, except middle of front lobe, rather thickly and somewhat coarsely punctate. Scutellum and corium more finely and evenly punctate; clavus with three rows of punctures. Length, 4.5—5.5 mm.

Buck Key, Fla. (*U. S. N. Mus.*). Recorded by Barber (1918c, 61) from Florida. Described from Mexico and Guatemala.

Tribe IV. GONIANOTINI Stal, 1872b, 58.

This tribe contains only the single genus, characterized below.

I. EMBLETHIS Fieber, 1861, 51, 197.

Head feebly declivent, scarcely as wide across the eyes as front margin of pronotum; beak reaching mesosternum, its first joint to base of head; pronotum wider than long, its side margins widely flattened, their width greater than diameter of eye, disk feebly convex, front margin concave; scutellum almost as long as pronotum, not carinate; elytra entire, reaching tip of abdomen, clavus irregularly punctate; costal margin of corium widely flattened and reflexed at base, gradually narrowed toward apex; hind tibiæ with setose bristles; basal segment of hind tarsus twice as long as others united.

381 (597). *EMBLETHIS VICARIUS* Horvath, 1908, 563.



Fig. 89. X 7. (After Bruner).

Elongate-oval. Above dull brownish-yellow rather thickly marked with fuscous punctures, these often aggregated to form dark blotches; membrane pale brown, often spotted near base with darker brown; antennæ brownish-yellow, the fourth joint dusky, under surface dull black, the margins in part paler; front femora fuscous, the knees paler; the other femora, tibiæ and tarsi brownish-yellow. Antennæ beset with rigid bristles, basal joint scarcely exceeding tip of tylus, second longest, third slightly shorter than fourth. Front femora armed beneath with numerous short teeth. Other characters

as under generic heading. Length, 6—6.2 mm. (Fig. 89).

Marshall and Vigo counties, Ind., Feb. 25—Aug. 8; probably occurs throughout the State. Common in winter in Vigo County, hibernating beneath mullein leaves and other cover in sandy localities, and found in summer on the ground and low herbage in cultivated fields. Dunedin, Fla., Dec. 13; one specimen taken from beneath bark of pine. Recorded only from Atlantic Beach, that State. Ranges from New England west to North Dakota, Montana and Vancouver, and southwest to Florida, California and Mexico. Formerly listed as *E. arcarius* (Linn.).

Tribe V. LETHÆINI Stal, 1872b, 59.

The members of this tribe have the head, small, triangular; ocelli widely separated the distance between them three times or more than that between them and eye; antennæ with basal segment usually exceeding apex of head by half or more its length, second usually longest, third and fourth subequal; beak reaching hind coxæ; pronotum quadrate or subtrapezoidal, its disk usually with an ill defined constriction separating it into two lobes; scutellum triangular, not or feebly carinate. Seven of the nine genera recognized by Barber (1918, 84) are represented in the eastern states.

KEY TO EASTERN GENERA OF LETHÆINI.

- a. Pronotum with both lobes distinctly and closely punctate; front tibiæ of males either strongly curved or bent and expanded apically and armed with one or two preapical teeth.
- b. Antennæ distinctly pilose; mesosternum not longitudinally sulcate; basal segment of hind tarsus much longer than the others united; body not strongly flattened. I. DRYMUS, p. 430.
- bb. Antennæ not pilose; mesosternum strongly sulcate; basal segment of hind tarsus subequal to others united; body much flattened. II. GASTRODES, p. 431.
- aa. Pronotum with front lobe impunctate or with a few scattered punctures; front tibiæ of males rarely strongly curved or abruptly expanded at apex; antennæ nearly nude.
- c. Dorsal surface dull or subopaque; expansion of side margins of pronotum wider and usually paler between the two lobes; hind tibiæ without long rigid bristles; front lobe of pronotum, head and scutellum black.
- d. Larger, length 5.5 or more mm.; apex of tylus not reaching middle of first antennal; side margins of pronotum more or less pilose; hind tibiæ with short bristles or long hairs. III. EREMOCORIS, p. 431.
- dd. Smaller, length not over 4 mm.; apex of tylus reaching to or beyond middle of first antennal; side margins of pronotum and hind tibiæ nude. IV. SCOLOPOSTETHUS, p. 433.
- cc. Dorsal surface shining; expansion of side margins of pronotum not widened, and usually not paler between the two lobes; hind tibiæ beset with rigid bristles; front lobe of pronotum, head and scutellum usually reddish or chestnut-brown; length less than 4.5 mm.
- e. Side margins of pronotum acute, converging in front, not pale or bordered within by an impressed line; width of head across eyes but slightly narrower than across front angles of pronotum.

- f.* Pronotum nearly twice as wide as long, its hind lobe sparsely punctate; membrane reaching apex of abdomen. V. VALTISSIVS, p. 434.
- ff.* Pronotum distinctly less than twice as wide as long, its hind lobe impunctate; membrane abbreviated; dorsal surface very shining. VI. XESTOCORIS, p. 435.
- ee.* Side margins of pronotum narrowly expanded, subparallel, usually pale and bordered within by an impressed line; width of head across eyes much narrower than across front angles of pronotum. VII. CRYPHULA, p. 436.

I. DRYMUS Fieber, 1861, 46, 178.

Species of small or medium size and having the head not inserted in thorax to eyes; pronotum with side margins rounded in front of middle, their edges but slightly expanded, more so opposite the constriction between the lobes, front lobe without definite collar; scutellum flat, rather thickly punctate, with a faint carina near apex; elytra entire, reaching tip of abdomen; hind tibiæ without rigid bristles; third ventral suture strongly curved, not reaching side margin; front femora armed beneath with a spine and several minute teeth. Two species are known, both occurring in the eastern states.

KEY TO SPECIES OF DRYMUS.

- a.* Pronotum with side margins narrowly pale, broadly rounded behind front angles; front lobe of pronotum darker and more finely punctate than hind one. 382. UNUS.
- aa.* Pronotum with margins and entire disk dark brown, the margins more strongly rounded; both lobes evenly, densely and rather coarsely punctate. 383. CRASSUS.

382 (598). DRYMUS UNUS (Say), 1832, 16; I, 333.

Elongate-oval. Head, front lobe of pronotum, scutellum and sterna dark brown; hind lobe of pronotum and elytra brownish-yellow punctate with fuscous, the corium often with vague darker blotches; membrane brown, the veins paler; antennæ reddish-brown, the third joint and base of fourth darker; ventral surface of abdomen and femora reddish-brown, tibiæ and tarsi paler. Head and front lobe of pronotum finely not densely punctate. Costal area of corium narrowly expanded. Length, 4.2—5 mm.

Lake, Porter, Cass and Marion counties, Ind., June 26—Oct. 11. Apparently a scarce species throughout the State, occurring beneath logs, stones, etc., on wooded slopes, usually near streams. Ranges from New England west to Colorado and southwest to North Carolina and Texas. Barber says that in the eastern states it is "commonly found by sifting dead leaves at the base of alders."

383 (599). *DRYMUS CRASSUS* Van Duzee, 1910, 76.

Larger and darker than *unus*. General color above and beneath a nearly uniform dark brown; elytra a somewhat paler brown; membrane dark-brown, the veins concolorous. Head and entire pronotum very densely and somewhat coarsely punctate. Costal area of corium more widely expanded at base than in *unus*. Other differences as in key. Length, 6.5—7 mm.

Southern half of Indiana, frequent, July 3—Oct. 10; not taken north of Marion County. On the former date it was found in numbers in Knox County beneath dead leaves on the sandy, densely wooded slope of a small stream. Ranges from New England west to southern Indiana and southwest to North Carolina.

II. *GASTRODES* Westwood, 1840, 122.

Oval depressed species of medium size, having the head triangular, pointed, slightly wider across eyes than front margin of pronotum; beak reaching middle coxæ; pronotum triangular, sides straight, and converging towards apex, which is only one-half the width of base; third ventral suture of abdomen almost straight and reaching side margins. Other characters as in generic key. A single introduced European species occurs in our territory.

384 (605). *GASTRODES FERRUGINEUS* (Linnæus), 1767, 730.

Elongate-oval, strongly depressed. Pale brick-red, shining; head, front lobe of pronotum, scutellum and sterna, piceous-black; under surface of abdomen reddish-brown, the sides fuscous; legs reddish-brown. Head, front lobe of pronotum and prosternum densely punctate. Hind lobe of pronotum and elytra much more sparsely punctate. Elytra covering the abdomen, the costal margins rather widely expanded. Fore femora much enlarged, flattened, their front margin serrate before and behind the preapical tooth. Length, 6—6.5 mm.

Banks (1910, 64) records this species from the "Northern States." I have seen only European examples.

III. *EREMOCORIS* Fieber, 1861, 49, 187.

Medium sized Lygæids having the head narrow, almost perfect, not inserted in thorax to eyes; pronotum longer than wide, apical lobe rather strongly convex, side margins with expansions wider and distinctly paler opposite the constriction;

scutellum longer than wide, finely and sparsely punctate; clavus with regular rows of punctures, its commissure shorter than scutellum; elytra entire, reaching tip of abdomen; front femora strongly swollen, armed beneath with one spine and numerous small teeth. Eight species are known from North America, two occurring in the eastern states.

KEY TO EASTERN SPECIES OF EREMOCORIS.

- a.* Disk of front lobe of pronotum almost impunctate; femora not pilose; smaller, length not over 6 mm. 385. FERUS.
- aa.* Disk of front lobe of pronotum finely and sparsely punctate, each puncture bearing an erect hair; femora thickly pilose with long erect hairs; larger, length 6.5 or more mm. 386. SETOSUS.

385 (600). EREMOCORIS FERUS (Say), 1832, 16; I, 333.

Elongate-oval. Head, disk of front lobe of pronotum, four stripes on hind lobe, scutellum and under surface fuscous-black; side margins of front lobe of pronotum and basal half of elytra, pale brownish-yellow; hind lobe of pronotum, except dark stripes and apical half of elytra chestnut-brown, the corium with fuscous blotches; membrane dark brown with conspicuous pale spot each side near apex of corium; antennæ fuscous, the first joint and basal half of second paler; front femora usually piceous, shining, remainder of legs and beak reddish-brown. Structural characters as above given. Length, 5.2—6 mm. (Fig. 90).

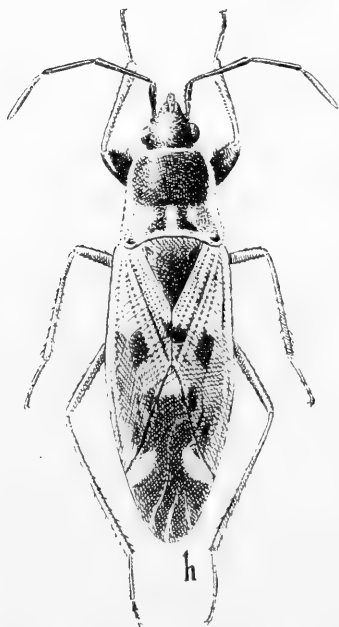


Fig. 90, X 10. (After Drake, Tech. Publ. No. 16, N. Y. St. Coll. For.).

Frequent in southern Indiana; Lake and Starke counties only in the northern portion. Occurs throughout the year, hibernating beneath cover along the borders of upland woods, sometimes a dozen or more within a space of a few square inches; in summer occurring on the ground, more commonly in sandy places. Sherborn, Mass., Oct. 24 (*Frost*). Ranges from Quebec and New England west to Colorado and Vernon, B. C., and southwest to South Carolina and Texas.

386 (—). EREMOCORIS SETOSUS Barber Ms.

Larger and darker than *ferus*. General color dark piceous-brown; narrow side margins of pronotum and costal margin of corium dull yellow; hind lobe of pronotum, elytra, antennæ and legs chestnut-brown, tarsi paler. Pronotum longer, the constriction less evident than in *ferus*; disk thickly pilose with erect yellowish hairs; hind lobe coarsely punctate. Head, elytra, femora and tibiæ thickly beset with similar hairs. Front tibiæ of males strongly curved, the apex widened. Length, 7—7.5 mm.

Vigo, Putnam, Knox and Posey counties, Ind., May 6—Aug. 11. Taken beneath logs on slopes of upland wooded pastures and swept from boneset and other Compositæ. Known in the east from New York, New Jersey and Virginia.

IV. SCOLOPOSTETHUS Fieber, 1861, 49, 188.

Small elongate-oval species having the head triangular, subparallel, inserted in thorax almost to eyes; beak reaching middle coxæ; pronotum as in *Eremocoris*; scutellum elongate-triangular, faintly carinate near apex; elytra entire and reaching tip of abdomen or abbreviated and reaching fifth dorsal. Other characters as in generic key. Sixteen species are known, four from North America. Of these three occur in our territory, all having a northern range.

KEY TO EASTERN SPECIES OF SCOLOPOSTETHUS.

- a. Apical third or less of elytra with a fuscous cross-bar.
 - b. Side margins of pronotum sinuate opposite the constriction and rounded in front; front femora armed with small teeth both before and behind the larger spine; membrane in macropterous form pale, the veins fuscous, without pale spot each side.

387. THOMSONI.
 - bb. Side margins of pronotum straight; front femora with small teeth only in front of larger spine; membrane fuscous, variegated with pale, in macropterous form with a large pale spot each side.

388. ATLANTICUS.
- aa. Apical half or more of elytra pale brown without fuscous cross-bar; side margins of pronotum almost straight; membrane dark brown with a large pale spot each side; front femora armed as in *atlanticus*.

389. DIFFIDENS.

387 (610). SCOLOPOSTETHUS THOMSONI Reuter, 1874, 562.

Elongate-oval. Head except tylus, front lobe of pronotum, scutellum and under surface piceous-black; side margins of pronotum and costal margin of corium in great part pale yellow; hind lobe of pronotum and basal two-thirds of elytra brownish-yellow, sparsely and finely punctate with fuscous; antennæ at base reddish-yellow, the last two

joints darker; front femora and preapical ring on hind ones usually dark brown; remainder of legs and hind margins of pro- and metapleura pale reddish-yellow. Head and front lobe of pronotum minutely sparsely punctate; hind lobe of pronotum and scutellum more distinctly punctate. Length, 3—3.5 mm.

Porter and Kosciusko counties, Ind., July 24—Sept. 15. Taken by sifting debris near sphagnum swamps. A European species ranging in this country from New England west and north to Colorado and Alaska. In the east not recorded south of New Jersey. Van Duzee found it not uncommon near Buffalo, N. Y., May to August, "among moss and rubbish in fence rows. The long and short-winged forms occur together as with *Blissus leucopterus*, with which it may be found in winter hibernating."

388 (611). *SCOLOPOSTETHUS ATLANTICUS* Horvath, 1893, 239.

Form and size of *thomsoni*. Color much as there, the hind margin of posterior lobe of pronotum usually darker, the preapical cross-bar of elytra more pronounced; last two joints of antennæ, except extreme base of third, fuscous-brown; legs wholly pale. Side margins of front lobe of pronotum rounded in front. Length, 3—3.5 mm.

Lakehurst, N. J., April 2 (*Barber*); taken by sifting under huckleberry. Sherborn, Mass., Oct. 18 (*Frost*). Ranges from New England west to Washington and Vancouver, B. C., not taken south of New Jersey. Bueno found it at the base of clumps of tussock grass or sedge, May—July, and swept it in numbers from the flowers or seeds of the tussock sedge in July. Out of 80 specimens only five were macropterous, and three had the antennæ defective, one having both antennæ only 3-jointed.

389 (612). *SCOLOPOSTETHUS DIFFIDENS* Horvath, 1893, 240.

Form and size of the other species. Color above paler; corium with apical half or more pale brown, the hind margin fuscous-brown; antennæ with tip of second, apical half of third and all of fourth joints brownish; femora all pale. Head and pronotum punctate as in *thomsoni*. Other differences as in key.

Cedar Lake, N. J., Oct. 25 (*Barber*). Ranges from Quebec and New England west to Idaho and California and south to New Jersey. Occurs under dead leaves.

V. VALTISSIUS Barber, 1918c, 62.

Small shining species having the head triangular, inserted in thorax to eyes; antennæ pilose, first joint nearly as long as

third, exceeding tylus by one-third its length; beak reaching hind coxæ; pronotum as in generic key, scarcely separated into two lobes, side margins straight, gradually converging toward apex; clavus with three rows of punctures, its commissure shorter than scutellum; front femora armed beneath with a few minute teeth and several long setæ; basal segment of hind tarsus much longer than others united. One species is known.

390 (593). *VALTISSIVUS DIVERSUS* (Distant), 1893, 407.

Elongate-oval. Above pale dull yellow, the head and scutellum with a brownish tinge; membrane milky-white; basal joint of antennæ reddish-yellow, the remainder dull brownish; under surface pale brown, the prosternum dull yellow. Third and fourth antennals subequal, second slightly longer than either. Head across eyes, a little narrower than front margin of pronotum. Hind lobe of pronotum and corium sparsely punctate, each puncture bearing an inclined yellowish hair. Length, 3 mm.

Brazos Co., Tex. (*Barber*). A neotropical species described from Guatemala and Panama and recorded from Florida and Texas (*Fan D.*, 1917). A specimen in the U. S. Nat. Museum is labeled Milwaukee Co., Wis.

VI. *XESTOCORIS* Van Duzee, 1906, 389.

Very small elongate-oval species having the head triangular, porrect, inserted in thorax to eyes; beak passing middle coxæ; first antennal surpassing tylus by one-half its length, second and fourth subequal, third slightly shorter; pronotum subquadrate, about one-half wider than long, not constricted to form two lobes; scutellum flat, triangular, not carinate; front femora armed beneath with one large and three very small teeth. One species is known.

391 (604). *XESTOCORIS NITENS* Van Duzee, 1906, 390.

Elongate-oval, widest across apex of clavus. Head, disk of pronotum, scutellum and under surface, chestnut-brown, strongly shining; narrow front and hind margins of pronotum, elytra and legs pale reddish-brown; antennæ reddish-brown, third and fourth joints in part piceous. Pronotum with a few coarse punctures behind front margin; hind angles nodulose above. Scutellum, corium and clavus with sparse, coarse punctures bearing erect hairs, those of the clavus in three rows. Membrane very short, not passing tip of corium, its veins subobsolete. Length, 3—3.5 mm.

Indian Lake, Sabael, N. Y., Aug. 24 (*Barber*). Known only from New England and New York. Occurs on the ground beneath leaves and other debris in damp localities.

VII. CRYPHULA Stal, 1874, 165.

Small oblong-oval species having the head moderately declivent, inserted in thorax to eyes; beak surpassing middle coxæ; pronotum subquadrate, two-thirds wider than long, sides subparallel to near front angles, then suddenly rounded into them, disk without transverse constriction; scutellum very flat, not carinate; costal margin of corium rather broadly flattened; elytra either entire and reaching tip of abdomen, or more commonly abbreviated and reaching sixth dorsal; front femora armed beneath with three or four minute preapical teeth, and several long bristles; tibiæ beset with stiff bristles; basal joint of hind tarsus one-half longer than the others united. Three species are known from North America, one from the eastern states.

392 (608). CRYPHULA PARALLELOGRAMMA Stal, 1874, 165.

Oblong-oval. Head, disk of pronotum in great part, base of scutellum and under surface, dark chestnut-brown and when fresh often with a bluish bloom; narrow side margins of pronotum and corium, hind angles of pronotum and some spots near base, three small elongate spots on apical half of scutellum, the veins and some vague markings on corium, pale dull yellow; membrane, macropterous form, grayish-brown, veins paler near base; first and second antennals brownish-yellow, third and fourth dark brown; legs pale brownish-yellow, the front femora darker. First antennal surpassing tylus by one-third its length; second and fourth subequal, third shorter. Pronotum with a few fine punctures near front margin; basal third and scutellum finely and sparsely punctate. Clavus with three rows of punctures; corium rather thickly and finely irregularly punctate. Length, 3—4 mm. (Fig. 91).

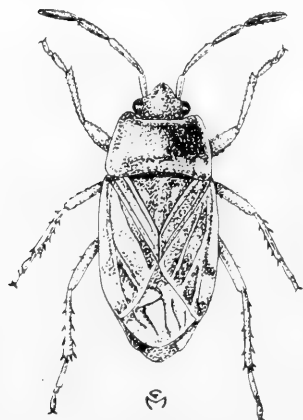


Fig. 91, X 10. (Original).

Frequent in southern Indiana; not taken, though probably occurs, in the northern counties. Occurs throughout the year, hibernating beneath stones and logs on the wooded slopes of streams and along the borders of upland fields; in summer found on the ground in similar localities beneath leaves and other debris, the nymphs in September; also on one occasion beaten from the flowers of the red haw, *Crataegus punctata* Jacq. Bassenger, Istokpoga and Dunedin, Fla., Nov. 21—April 11;

the first records for that State. Frequent about Dunedin, the nymphs in February. Taken beneath up-ended blocks of freshly sawed pine and by sifting vegetable debris. These Florida specimens average smaller and somewhat darker than those from Indiana. Ranges from New England and New York west to Kansas and southwest to Florida, Texas and New Mexico.

Family XII. PYRRHOCORIDÆ Fieber, 1860, 43.

THE RED-BUG FAMILY.

A small family of elongate-oval subtropical or tropical species of stout form, soft texture and usually strongly contrasting colors, black or brown with red or yellow being the prevailing hues. They have the head usually triangular, somewhat declivent, inserted in thorax to eyes; ocelli absent; beak 4-jointed;⁵³ antennæ slender, 4-jointed; elytra without a cuneus; membrane with two large cells at base, these giving rise to about eight branching veins (fig. 6, *d*); tarsi 3-jointed; osteola absent. By many authors the family is treated as a subfamily of Lygæidæ from which its members are distinguished mainly by the absence of ocelli.

Only about 300 species of Pyrrhocoridæ are known, those of the first subfamily largely from the tropical regions of Central and South America, where, says Uhler, "each geographical province has two or three species peculiar to itself." They are plant feeders, usually gregarious in habit, living in colonies upon the foliage, to which they often do much damage. The literature pertaining to them is widely scattered. Van Duzee recognizes 22 species from America north of Mexico, nine of which are recorded from the southern states. These represent four genera, separated as follows:

KEY TO EASTERN GENERA OF PYRRHOCORIDÆ.

- a.* Sides of pronotum not margined or reflexed; sixth ventral of female cleft to the base. (Subfamily Euryopthalminæ Van D.).
- b.* Head triangular, subdeclivent; eyes shortly stylated, strongly protruding; form ovate; front coxæ unarmed.
 - I. EURYOPHTHALMUS, p. 438.
- bb.* Head subglobose, convex above and beneath; eyes sessile, but little protruding; form narrow, elongate.
 - II. ARHAPHE, p. 440.
- aa.* Sides of pronotum margined and reflexed; sixth ventral entire in both sexes. (Subfamily Pyrrhocorinæ Stal).

⁵³In reality 5-jointed, the basal joint very short, almost invisible.

- c. Apical angle of corium rounded, fourth joint of antennæ scarcely longer than third; elytra often abbreviated.

III. PYRRHOCORIS, p. 441.

- cc. Apical angle of corium acute; fourth joint of antennæ much longer than third; elytra always entire, covering the abdomen.

IV. DYSDERCUS, p. 441.

I. EURYOPHTHALMUS Laporte, 1832, 38.

Rather large, narrowly oval species having the head inserted in thorax to the prominent protruding eyes; antennæ slender, first joint longest, third shortest; beak reaching or slightly passing middle coxæ; pronotum subtrapezoidal, edge of side margins rounded, disk with a vague median transverse impression; scutellum nearly an equilateral triangle, its apex acute; corium slightly widened just behind the middle; fore femora armed beneath with two or three short preapical spines. Seven species are recognized from the region north of Mexico, three from the eastern states. They were formerly listed as *Largus* Hahn.

KEY TO EASTERN SPECIES OF EURYOPHTHALMUS.

- a. Ventral surface of abdomen black or piceous; membrane fuscous; elytra without yellow spot.
 b. Second and fourth joints of antennæ subequal in length; color above dull black, the side margins pale. 393. SUCCINCTUS.
 bb. Fourth joint of antennæ distinctly longer than second; color above mainly dull red, punctured with fuscous. 394. DAVISI.
 aa. Ventral surface of abdomen ivory-white or dull yellow; membrane and a large spot on elytra dull yellow. 395. SELLATUS.

393 (617). EURYOPHTHALMUS SUCCINCTUS (Linnaeus), 1763, 17.



Fig. 92, X 2.
(After Uhler).

Elongate-oval, robust. Black, feebly shining, sparsely clothed with a very fine grayish pubescence; narrow side and hind margins of pronotum, costal margin of corium, edge of connexivum and bases of femora dull red or reddish-yellow. Third joint of antennæ less than half the length of second. Disk of front lobe of pronotum impunctate, slightly convex, declivent in front; of hind lobe almost flat, coarsely and sparsely punctate. Scutellum and corium rather coarsely, evenly, not densely punctate; connexivum narrowly exposed. Membrane usually reaching sixth dorsal. Length, 14—17 mm. (Fig. 92).

Sanford and Dunedin, Fla., Jan. 12—April 3. Occurs infrequently in winter on the foliage of wax-myrtle and oak. Found

throughout Florida as far south as Ft. Myers. A species of southern range, extending along the Atlantic coast from New York southwest to Florida, Texas, Colorado and Arizona, part of the records probably referring to the next. Uhler records it (1884, 288) as "living along the borders of oak woods in Maryland and Virginia, appearing fully adult in the months of July and August. The young stages are of a brilliant steel-blue color with reddish legs and a bright red spot at the base of the abdomen." Morrill (1910, 94) mentions it as injurious to cotton bolls in Texas and states that its host plant in that region is the weed, *Solanum torreyi* Gray.

394 (618). EURYOPHTHALMUS DAVISI (Barber), 1914, 507.

Elongate-oval, robust. Disk of front lobe of pronotum, basal half or more of scutellum and entire under surface dull black, densely clothed with a short, fine, silvery gray pubescence; membrane pale brown; remainder of upper surface dull red punctured with fuscous, and more sparsely pubescent. Antennæ and legs black, the bases of femora red. Third joint of antennæ half the length of second, the two united subequal to first. Pronotum relatively narrower and slightly shorter than in *succinctus*, its disk feebly declivent from the base forward; hind lobe more finely punctate. Length, 10—14 mm.

Moore Haven, Caxambus, R. P. Park, Sarasota and Dunedin, Fla., Dec. 2—April 12. Frequent about Dunedin on low herbage and beneath cover along the margins of wet-weather ponds. The types were from St. Augustine and as far as known it occurs only along or near the coasts of that State. It was mentioned by Uhler (1876, 315) as being a variety of *succinctus* "of a dirty sand-red occurring on the sea-islands of Florida;" also (1884, 288) "specimens (of *succinctus*) from the sea-coast of Florida are of a pale tile-red color above and bluish-gray beneath." Aside from color, the longer fourth antennal and more densely pubescent surface easily distinguish it from *succinctus*.

395 (620). EURYOPHTHALMUS SELLATUS (Guerin), 1857, 401.

Oblong-oval. Head, antennæ, middle of thorax, scutellum, base of clavus, corium in great part, sterna, tibiæ and tarsi dull black, sparsely and finely pubescent; hind lobe of pronotum, a large common spot on clavus and corium and entire membrane dull yellow; apical fourth and side margins of pronotum, costal margin of corium and front and middle femora orange red; hind femora with apical half in great part black. First and fourth joints of antennæ subequal, second and third united subequal to fourth. Pronotum with sides sinuate near middle; front lobe with central black portion of disk elevated, depressed orange portion

with a curved row of coarse punctures; hind lobe impunctate except a few punctures in front. Length, 10 mm.

Guantanamo, Cuba, Feb. 15 (*Gerhard*). Vinales, Cuba, Sept. 16 (*Barber*). Described from that island. Recorded from St. Augustine, Fla., by Barber. The color varies to some extent, the front margin of each ventral and a ring on middle femora being often black.

II. ARHAPHE Herrich-Schaeffer, 1853, 175, 183.

Elongate slender-bodied species having the head subglobose, wider than pronotum, usually pilose with erect bristles, rounded and sessile behind the eyes, its front almost vertical; pronotum bell-shaped, strongly constricted at middle, front lobe subglobose, one-third longer and distinctly narrower than hind one; scutellum large, sub-equilateral; elytra brachypterous, reaching middle of third dorsal; front femora unarmed. One of the three known North American species occurs in the southern states.

396 (623). ARHAPHE CARCLINA Herrich-Schaeffer, 1853, 183.

Elongate, subparallel. Black, shining; front lobe of pronotum and under surface, except middle of abdomen, densely clothed with a floccose yellowish-white pubescence; corium with a large triangular posthumeral whitish spot, the apex forward, this followed by a broad velvety-black cross-bar, the apex behind this yellowish-white; membrane yellowish-white at base, the apical third black; tarsi brown. Head, pronotum, scutellum and elytra except membrane, coarsely, rather sparsely punctate, each puncture bearing a suberect black or white stiff hair. First and fourth antennals subequal, third shortest. Beak reaching middle coxæ. Membrane with veins scarcely perceptible, reaching middle of fourth dorsal. Connexivum of male almost flat, of female strongly reflexed. Length, 8—10 mm. (Fig. 93).



Fig. 93. X 3. (Original).

Istokpoga and Dunedin, Fla., Jan. 4—March 29; one specimen taken at each place while sweeping Ericads; four others at Dunedin hibernating in bases of tufts of grass along a sandy roadway. No other Florida record. Rabun Co., Ga., July (*Davis*). Mobile, Ala., Feb. 12 (*Gerhard*). Ranges from "Carolina," the type locality, southwest to Texas and Mexico.

III. PYRRHOCORIS Fallen, 1814, 9.

Oval subdepressed species of medium size having the front of head declivent, as wide across eyes as front margin of pronotum; first joint of beak slightly longer than head; pronotum subquadrate, front margin broadly concave, side margins acute, reflexed; elytra often abbreviated and then without a membrane, apical margin of corium rounded. One introduced European species has been taken in the eastern states.

397 (626). PYRRHOCORIS APTERUS (Linnæus), 1758, 447.

Elongate-oval. Black, shining; pronotum orange-red, a large sublunate transverse callosity on front lobe and cross-bar on hind one black; corium orange-red, a triangular spot near base and a larger round one on apical third black; membrane fuscous-brown; connexivum, coxæ and hind margins of all pleura and sixth ventral orange-red. Antennæ fuscous-black, finely and sparsely pubescent; joint 1 rather stout, feebly curved, as long as head; 2 more slender and slightly longer than 1; 3 half the length of 2. Pronotum with callosity on front lobe smooth or minutely strigose; remainder of disk, as well as that of scutellum, coarsely and irregularly punctate, hind margin truncate. Elytra very finely and sparsely punctate. Length, 9.5—10.5 mm.

France (*U. S. Nat. Mus.*). A cosmopolitan species recorded from Snake Hill, N. J., by Barber (1911b, 112). Distant mentions it also from Costa Rica.

IV. DYSDERCUS Amyot & Serville, 1843, 272.

Elongate-oval, depressed glabrous species of medium size having the head porrect, convex, inserted in thorax to eyes and wider across them than front margin of pronotum; antennæ slender, first joint usually longest, second and fourth often subequal, third shortest; beak reaching second ventral; pronotum subtrapezoidal, narrowed in front, side margins acute, reflexed, disk with a deep transverse impression in front of middle, front lobe with a wide usually pale collar; scutellum small, impunctate, not carinate; fore femora armed beneath with several small preapical spines. This is a large genus of particolored species, the red largely predominating. Stal (1874, 117) recognized 32 from America and Van Duzee (1917) nine from the United States. Of these four occur in our territory.

KEY TO EASTERN SPECIES OF DYSDERCUS.

- a. Corium red, narrowly margined with white, usually with a large transverse dark spot on apical third; length usually less than 11 mm.

398. ANDRÆÆ.

- aa. Corium not red and without a black spot; length, 11.5 or more mm.
 b. Ventral segments red or brown, their hind margins white; femora red.
 c. Corium pale with a black or brown stripe, or black or brown with a wide pale outer margin; hind lobe of pronotum impunctate; scutellum black. 399. MIMUS.
 cc. Corium black or brown with narrow costal and apical margins pale; hind lobe of pronotum evidently but shallowly punctate; scutellum dull red. 400. SUTURELLUS.
 bb. Ventrals black; femora piceous. 401. OBSCURATUS.

398 (632). *DYSDERCUS ANDREÆ* (Linnaeus), 1758, 448.

Elongate-oval. Clear red; front and hind submargins and narrow edge of side margins of pronotum, disk of clavus, spot on apical third of corium, antennæ, tibiæ and tarsi, dull fuscous to black; narrow front and hind margins of pronotum, inner and apical margins of corium, outer edge of clavus and hind margin of each ventral segment yellowish-white; membrane purplish-black, the very narrow margin white. Pronotum impunctate, its side margins slightly concave. Length, 8—11.5 mm.

Baracon, Cuba, April (*Davis*). Jamaica, W. I. (*Gerhard*). Taken at Biscayne Bay, Fla., by Mrs. A. T. Slosson. Van Duzee (1907, 18) records it as very common in Jamaica, occurring in great numbers on trees and bushes and frequently coming to light at night. Hunter (1902) states that in Cuba it often does much damage to cotton, dwarfing the bolls and staining the fibre. He calls it the "St. Andrew's cotton-stainer" in allusion to the white cross formed by the markings on the elytra, and adds "more than a century ago Sloane, a traveller in Jamaica, referred to the insect as 'a Cimex of a scarlet-red with a white St. Andrew's cross on its back.' It is very often to be met with amongst flowers." The *Capsus ocreatus* Say (I, 338), Van Duzee No. 634, is probably this species. Say's description, as far as it goes, agrees with *andreæ*. He does not mention the "cross" on the back, but perhaps had a specimen in which it was absent as it is in one before me. His type was from Georgia and no subsequent record has been made.

399 (627). *DYSDERCUS MIMUS* (Say), 1832, 20; I, 338.

Elongate, narrowly oval. Color and size exceedingly variable, usually with occiput, antennæ, disk of hind lobe of pronotum, scutellum, clavus and disk of corium dark brown to blackish fuscous; head (except occiput) extreme base of antennæ and front lobe of pronotum (except collar) bright red; side margins of pronotum and broad outer margin of corium ochre yellow; membrane brown, its edge narrowly pale; collar, hind margin of each ventral segment and coxal plates ivory-white; front half or more of each ventral red or brown; femora red, tibiæ and

tarsi piceous. Side margins and collar of pronotum and costal margin of corium broader and more reflexed than in our other species. Length, 11—18 mm.

Crizaba, Mexico, July (*H. S. B.*); common on foliage and flowers in gardens and moist waste places. Biscayne Bay, Fla., Slosson Coll. Described from Mexico and known in this country also from Texas, Arizona and California. Uhler (1876, 314) states that "in some varieties the head, pronotum and corium are entirely black and from this to a variety with only a point of black on middle of corium, every phase occurs." In two of the examples at hand the ventral segments are almost wholly ivory-white, in others largely brown or red. Stal (1854, 236) described Say's typical form as *D. albidiventris* and limited Say's name to the two varieties mentioned by Say, a proceeding not in accordance with the ethics of present day nomenclature. His *flavo-limbatus* (1861, 198) appears from the description and Distant's figure to be the same as Say's var. *a* and his two names, as well as Distant's *obscuratus* will in time probably be found to apply only to color varieties of Say's species.

400 (633). *DYSDERCUS SUTURELLUS* (Herrich-Schaeffer), 1842, 76.

Elongate, narrowly oval. Ground color bright to dull red; disks of hind lobe of pronotum, clavus and corium dark brown; collar of pronotum, narrow margins of clavus and costal and apical margins of corium yellowish-white; membrane dark brown, the narrow apical margins pale; antennæ piceous-brown, the extreme base red; femora red, the tibiæ, tarsi and apical joint of beak piceous-black. Pronotum with side margins strongly reflexed; disk of hind lobe, as well as those of clavi and elytra, sparsely, finely, shallowly punctate. Length, 12—17 mm. (Fig. 94).

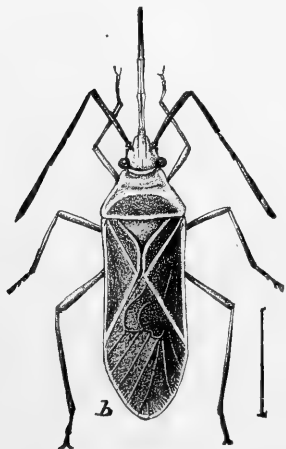


Fig. 94, X 3.
(After Riley and Howard).

Lakeland, Utopia, R. P. Park, Moore Haven, Ft. Myers, Cape Sable, Caxambus and Dunedin, Fla., Nov. 22—Aug. 5 (*W. S. B.*). Recorded from numerous other stations and doubtless found throughout the State. Occurs in

colonies on foliage of wild *Hibiscus*, cotton and other Malvaceæ, and also attracted to light. Known as the "cotton-stainer" or "red-bug," and does much damage to

cotton by sucking the juices of the young bolls, the injury often resulting in staining the fibre of the mature bolls by the injured seeds. Ranges from South Carolina to Alabama, the Bahamas and West Indies. For a full account of its habits see Riley and Howard (1889).

401 (635). *DYSDERCUS OBSCURATUS* Distant, 1883, 230.

"Closely allied to *D. flavo-limbatus*, Stal, but differing in having the anterior lobe of pronotum (excluding the anterior and lateral margins) black with a reddish spot each side; beneath the ground color of the abdomen is black and not red, the femora piceous. Long. 10—15 mm." (*Distant*).

Described from Costa Rica. Recorded by Van Duzee, 1917, from "S. St.," with a note "Reference for this record lost." Judging from the above brief description and the figure of Distant it is probably but a color variety of *D. minus* (Say).

Family XIII. THAUMASTOCORIDÆ Reuter, 1912b, 58.

THE ROYAL PALM BUGS.

Small, flattened, oblong-oval insects, having the head porrect; beak short, 3-jointed; antennæ 4-jointed; ocelli present, widely separated; elytra entire, wider and longer than abdomen, membrane without veins; osteola invisible; coxæ globular, widely separated; tarsi 2-jointed; venter of male consisting of eight segments besides the genital, of female with seventh segment covering the genital.

Three genera are known, two from Australia, the other represented in Cuba and Florida by a single species.

I. XYLASTODORIS Barber, 1920, 100.

In addition to the family characters mentioned, this genus has the head nearly as wide as long, tylus and cheeks subequal in length, with sides parallel; bucculæ low, widely separated; beak not reaching middle of prosternum; pronotum wider than long, its margins expanded, slightly elevated; clavus with sides parallel; commissure shorter than scutellum; tarsal claws furnished with arolia; male with seven pairs of spiracles on the ventral surface.

402 (—). *XYLASTODORIS LUTEOLUS* Barber, 1920, 101.

Oblong-oval, strongly depressed. Color a uniform pale yellow; eyes reddish-brown; apical half of fourth antennal, tip of beak and usually the apex of scutellum, fuscous-brown. Head with apex subtruncate,

abruptly contracted behind eyes, the latter not contiguous with pronotum. Joint 1 of antennæ reaching apical third of cheeks, 2 and 3 sub-

equal, each about twice as long as 1, 4 slightly fusiform, pubescent, almost as long as 3. Pronotum with a rather wide, shallow submedian transverse impression; sides flattened, feebly concave near middle, hind lobe finely thickly punctate. Scutellum subequilateral, disk slightly concave, sparsely punctate and with a vague median carina. Elytra subhyaline, distinctly punctate, margins rather widely flattened. Length, 2—2.5 mm. (Fig. 95).

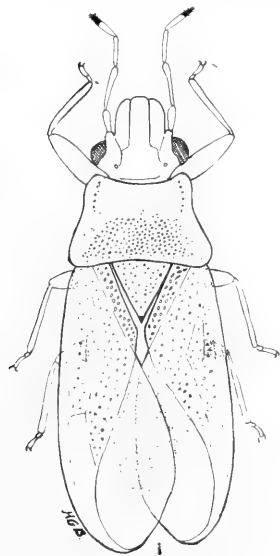


Fig. 95. X 28.
(After Barber).

Miami Beach, Fla., May 12; from young leaves of royal palm 35 feet above the ground (*R. Hart*). Santiago de las Vegas, Cuba, May (*Barber*). Recorded by Moznette (1921, 11) from Cocoanut Grove, Fla., where it was causing much damage to the expanding leaflets of the royal palm, *Orcodoxa regia* H. B. K.

Superfamily TINGIDOIDEÆ Reuter, 1921b, 27.

This superfamily comprises those members of Reuter's Series Anonychia which are principally characterized by having the upper surface of the body, especially the elytra, more or less finely reticulate or lace-like. They also agree in having the bucculæ elevated to form a sulcus for the reception of the beak; antennæ 4-jointed, joint 2 short, 3 longest, 4 fusiform with apex sometimes attenuate; pronotum usually more or less prolonged backward to cover the scutellum; elytra always devoid of a cuneus and with membrane usually ill-defined; hind coxæ rotatory; tarsal claws with arolia. To the superfamily belong only two families.

KEY TO FAMILIES OF TINGIDOIDEÆ.

- a. Ocelli present; cheeks longer than tylus; pronotum not prolonged behind to cover the scutellum; membrane well defined, not reticulate. Mainly terrestrial; phytophagous.
Family XIV. PIESMIDÆ, p. 447.
- aa. Ocelli absent; cheeks not longer than tylus; pronotum more or less prolonged backward, covering the scutellum; membrane reticulate, feebly differentiated. Terrestrial, thamnophilous or arboreal; phytophagous.
Family XV. TINGIDIDÆ, p. 448.

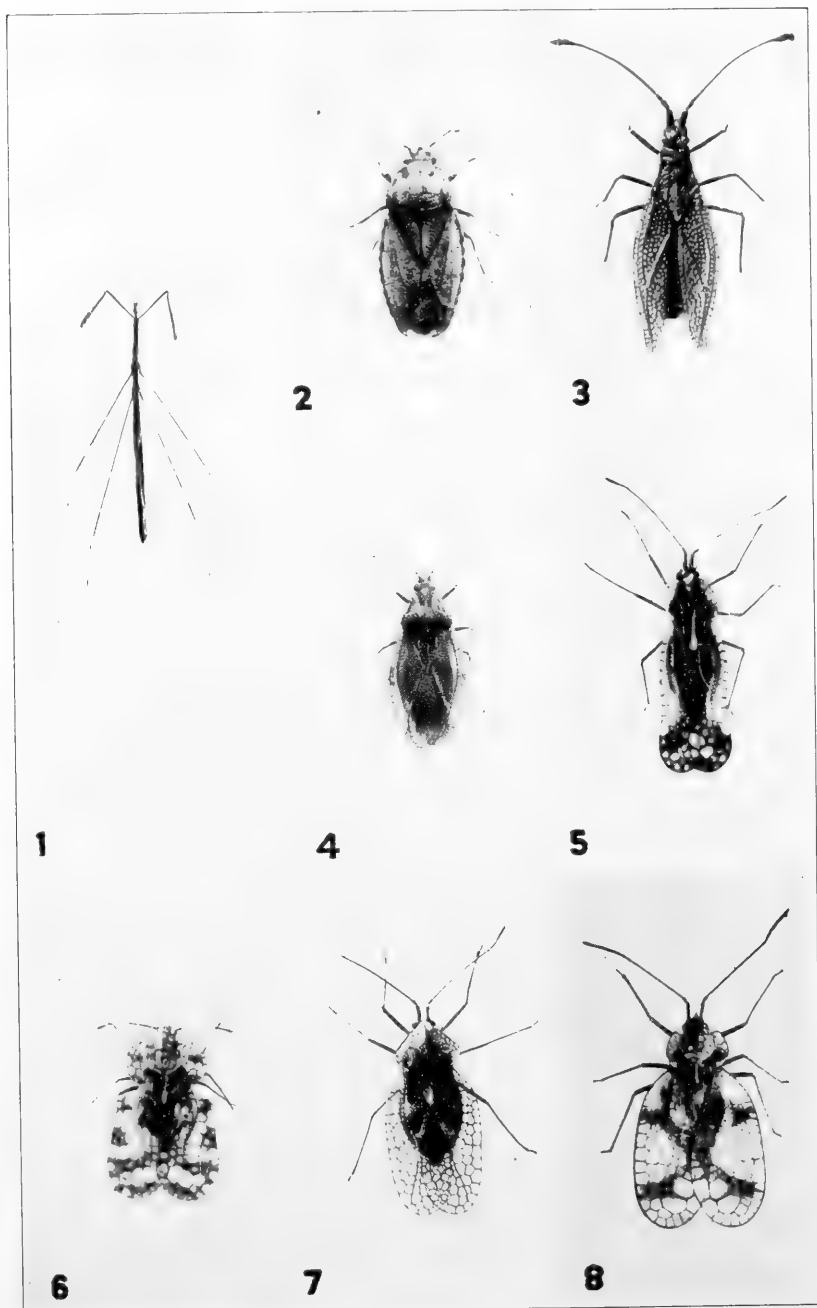


Plate IV. PLOIARIIDÆ AND TINGIDIDÆ.

Fig. 1, *Emesaya brevipennis* (Say); 2, *Piesma cinerea* (Say); 3, *Melanorhopala clarata* Stal.; 4, *Physatocheila plera* (Say); 5, *Gelchossa heidemanni* (O. & D.); 6, *Corythuca marmorata* Uhler; 7, *Gargaphia angulata* Heid.; 8, *Stephanitis pyrioides* Scott. (After Walden, in Hemiptera of Connecticut).

Family XIV. PIESMIDÆ Amyot & Serville, 1843, 300.

THE ASH-GRAY LEAF-BUGS.

Small oblong-oval Heteroptera having the head porrect, inserted in thorax to eyes; cheeks longer than tylus and usually contiguous in front of it; ocelli present; beak 4-jointed, slightly surpassing front coxæ; pronotum subquadrate, elevated behind the middle, disk carinate, not prolonged backward over the scutellum; macropterous forms with corium closely reticulated, its discoidal area divided by a longitudinal vein; clavus and membrane distinct, the former reticulated, the latter finely granulated but without cells; tarsi 2-jointed.

The family is represented by only a single genus and has in the past often been classed as a subfamily either of the Lygæidæ or the Tingididæ, but is in reality a connecting link between the two. Our North American species have recently been treated by McAtee (1919b).

I. PIESMA Le Peletier & Serville, 1828, 653.

In addition to the characters above given, the species of this genus have the head wider than long; antenniferous spines prominent, acute; antennæ shorter than head and pronotum united, joint 1 stout, not reaching tip of tylus, 2 oval, shorter than 1, 3 slender, as long as the others united, 4 subclavate, pubescent; pronotum narrowed in front, side margins flattened, disk with five low but distinct carinæ, the middle one anterior, shorter than the others; thorax on under side of front portion of pronotum hollowed out, forming a cavity to the inner wall of which is attached a large mass of muscles; scutellum very small, nodulose at apex; commissure of clavus four times as long as scutellum; elytra covering the abdomen; membrane with four oblique cross-veins. Of the ten nominal species recognized by McAtee only one is known from the eastern states.

403 (636). PIESMA CINEREA (Say), 1832, 27; I, 349.

Oblong-oval. Dull gray or straw-yellow, more or less mottled with brown or fuscous, the elevated hind lobe of pronotum often almost wholly brown; costal margin of elytra alternated with pale and dark; antennæ and legs dull yellow, the fourth antennal and claws darker. Pronotum narrower in front than behind, side margins broadly shallowly emarginate near middle; disk densely rather coarsely punctate, the carinæ distinct. Length, 2.7—3.2 mm. (Pl. IV, fig. 2).

Common throughout Indiana, more so in the southern counties. Found throughout the year, hibernating in colonies beneath the bark of oak, sycamore and other trees and beneath logs and rubbish near them; in spring and summer on the rough pigweed, *Amaranthus retroflexus* L., also on the foliage of sycamore, buckeye, beech and various other plants. Lakeland, Sanford, LaBelle, Ft. Myers, Chokoloskee and Dunedin, Fla., Feb. 9—April 3; taken on foliage of the button-wood, *Conocarpus erecta* L., and beneath bark and chunks along the margins of ponds. Recorded from Florida only from Lake Worth. These southern specimens differ from those in Indiana in being of a general paler hue, and in having the cheeks cylindrical, porrect, or even curved upward and not meeting in front of tylus; thorax narrower with sides more explanate, very feebly if at all emarginate. They may be known as var. *floridana*.

P. cinerea is a species of wide distribution, ranging from Ontario and New England westward to the Pacific and southwest to Florida, Texas and Mexico. It has been recorded by Summers as injuring the leaves and flowers of grapes. Weis & Lott (1924, 233) state that in New Jersey it feeds by hundreds on the flower heads and foliage of the dark green bulrush, *Scirpus atrovirens* Muhl., and the rough pig-weed above mentioned, causing the upper surface of the leaves to become mottled or spotted with white. A wholly pale form, var. *inornata* McAtee, one specimen of which is at hand from Indiana, occurs rarely with the typical one.

Family XV. TINGIDIDÆ Laporte, 1832, 47.

THE LACE BUGS.

Small oval or oblong species, having the upper surface reticulated, usually in such a manner as to cause the areolæ or cells to resemble gauze or lace work, hence the common name. The head is small, triangular; cheeks shorter than tylus; ocelli absent; vertex often furnished with spines; antennæ 4-jointed, the third joint longest; beak 4-jointed; pronotum with disk carinate, prolonged backward in the form of a triangular process which in our species covers the scutellum; elytra more or less reticulated throughout, without distinct clavus or membrane (fig. 96); disk of corium not divided by a longitudinal vein, its cells membranous, often hyaline; tarsi 2-jointed.

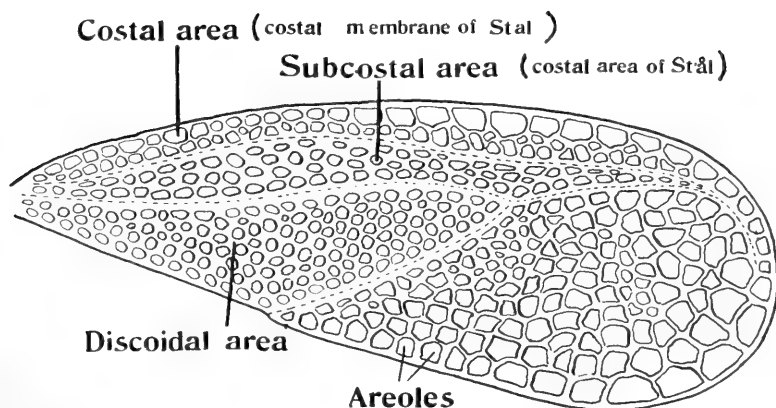


Fig. 96. Elytron of a Tingid, *Physatocheila pleza* (Say) showing the areas and the areolæ or cells. (After Parshley in Hemiptera of Connecticut).

The family is represented throughout the world, about 350 species being known. All are plant feeders, living mainly in all stages on the under sides of leaves, where they suck the sap causing the upper surface to become whitened and the lower one spotted and discolored by their excrement. Each species has its preferential host-plant on which, or on closely allied plants, it spends its life. The adults of many species hibernate beneath bark, dead leaves or other cover. Others pass the winter in the egg stage, the eggs being either attached to the under surface of the leaves and covered with a dark, somewhat shining varnish-like substance, or inserted in the tissues and covered with a brownish scab-like crust. The more common or better known species are two-brooded and undergo four or five nymphal stages, the first brood appearing in May or June, the second in late August or September. The principal literature on our American species has appeared in recent years, scores of new species having been described in and since 1916, when Osborn & Drake issued their "Tingitoidea of Ohio." That most useful to the student is as follows: Stål, 1873; Uhler, 1878; Distant, 1897; Bueno, 1916; Gibson, 1918, 1919; Barber & Weiss, 1922; Bergroth, 1922, and the numerous papers of Osborn & Drake, Parshley, Heidemann and Drake, mentioned in the Bibliography near the end of this work.

More than 120 species of the family are now recognized from North America, 73 of which occur in the eastern states. These are divided among 22 genera, all belonging to the subfamily

Tinginae Stal, which is characterized by having the scutellum wholly concealed by the prolonged triangular posterior portion of pronotum and the clavus wanting. For convenience of treatment the subfamily is separated into three tribes. The names of the principal structures used in their classification are shown in figs. 96 and 97.

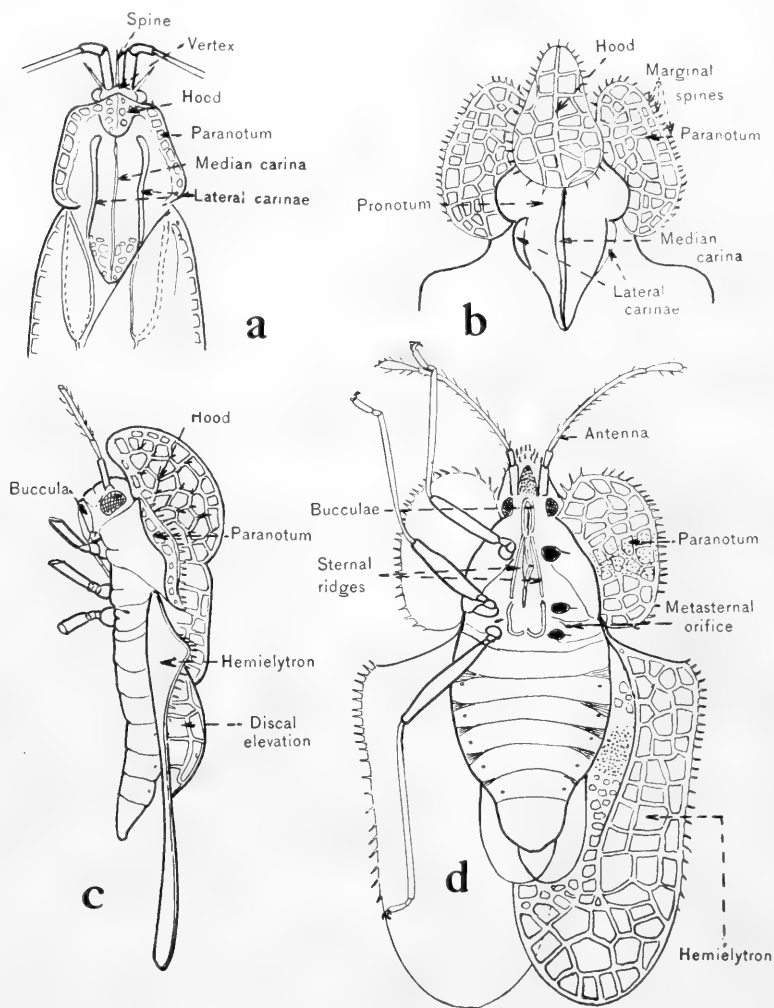


Fig. 97. STRUCTURES OF TINGIDIDÆ.

a, Dorsal view of head and pronotum of *Gelchossa oblonga* (Say); b, dorsal view of pronotum of *Corythuca ciliata* (Say); c and d, lateral and ventral views of the same species. All greatly enlarged. (After Garman in Hemiptera of Connecticut).

KEY TO EASTERN TRIBES OF SUBFAMILY TINGINÆ.

- a.* Front part of pronotum elevated into a more or less inflated or bulbous hood; paranota and costal margins of elytra expanded and projected much beyond the sides of body (fig. 97, *b, d*).
- b.* Elytra for the most part widely reticulate and membranous, the cells usually hyaline; discoidal area of elytra confined to the basal half; osteolar opening (metasternal orifice) distinct, rarely (*Galeatus* and *Dictyonota*) wanting (figs. 97, *d*, 98).

Tribe I. GALEATINI, p. 451.

- bb.* Elytra closely reticulated, the cells, except those of costal area, small and mostly subopaque; discoidal area reaching apical third or fourth; osteolar openings absent (fig. 111).

Tribe II. ACALYPTINI, p. 479.

- aa.* Front part of pronotum without an inflated hood, its median carina often slightly elevated to form a small hood-like elevation; elytra closely reticulate and for the most part coriaceous and opaque; paranota and costal margins of elytra much less expanded, but little projecting beyond the sides of body (fig. 116).

Tribe III. PHYSATOCHEILINI, p. 482.

Tribe I. GALEATINI tribus novum.

In this tribe, which includes our most common and best known species of lace-bugs, the reticulation of the upper surface is best developed, the areolæ or cells at times being very large and transparent. The hood varies much in form and size, being usually large and spherical behind, the front portion usually entirely covering the head, but often compressed and reaching only to vertex (fig. 97, *a*) ; side margins of pronotum (known as *paranota*) as well as those of the elytra, flattened and extending much beyond sides of body; backward prolongation of pronotum usually tricarinate. Ten of our eastern genera are included in the tribe.

KEY TO EASTERN GENERA OF TRIBE GALEATINI.

- a.* Pronotal hood large, bulbous, cleft behind to receive the front portion of a compressed elevation formed by the two greatly enlarged hemispherical lateral carinæ; areolæ of elytra very large, rectangular, vitreous (fig. 98). I. GALEATUS, p. 452.
- aa.* Hood not cleft behind; lateral carinæ of pronotum not expanded and elevated; areolæ much smaller.
- b.* Pronotal hood large, extending completely over the head; front portion of median carina of pronotum more elevated than the lateral carinæ.
- c.* Hood with front portion triangular and compressed, hind portion usually bulbous; basal third of each elytron with a tumid elevation.

- d.* Lateral carinæ of pronotum abbreviated, not extending forward to hood; hood compressed in front, bulbous behind, usually distinctly higher than median pronotal carina.
- e.* Side margins of paranota and basal portion of costal margins of elytra usually furnished with a fringe of small spines; costal margins of elytra usually in great part parallel, rarely slightly concave. II. CORYTHUCA, p. 453.
- ec.* Side margins of paranota and elytra without spinules; margins of elytra convexly rounded, never parallel, the costal area much expanded behind middle. III. STEPHANITIS, p. 468.
- dd.* Lateral carinæ of pronotum entire, reaching hood; margins of paranota and costal margin of elytra with a fringe of fine hairs; hood compressed throughout its length, viewed from the side scarcely as high as median carina. IV. LEPTOBYRSA, p. 469.
- cc.* Hood elongate, curved downward over the head, its crest with a single row of cells each side of median carina; elytra without tumid elevations, but with margins of discoidal areas strongly elevated. V. CORYTHAICA, p. 470.
- bb.* Pronotal hood small, viewed from the side compressed, not extended over the head; median carina of pronotum but little more elevated than lateral ones; basal third of elytra without elevations.
- f.* Third antennal segment much thickened, rugose and bearing numerous short erect setæ. VI. DICTYONOTA, p. 472.
- ff.* Third antennal segment slender, usually without setæ.
- g.* Median groove of sterna interrupted by a transverse sinuous carina between the meso- and metasternum; costal areas of elytra much expanded, not parallel at base, furnished with four or five rows of areolæ. VII. GARGAPHIA, p. 472.
- gg.* Median groove of sterna not interrupted by a cross carina.
- h.* Pronotum tricarinate, the carinæ entire, reaching hood; side margins of paranota without spines.
- i.* Form elongate, slender; costal area of elytra subparallel at base, sinuate and narrowed at or behind middle; paranota not formed of two membranes united on the outer edge. VIII. GELCHOSSA, p. 475.
- ii.* Form oval; costal area of elytra broadly curved, not narrowed at middle; paranota formed of an upper and lower membrane which are separated on outer edge by a membrane containing a single row of cells. IX. LEPTODICTYA, p. 477.
- hh.* Pronotum with only a median carina; side margins of paranota with prominent processes or spines. X. ACANTHOCHEILA, p. 479.

I. GALEATUS Curtis, 1833, 196.

Relatively large species, having the head armed with five long, acute black spines; paranota strongly flattened and re-flexed, each with a single row of five areolæ, the three inner

ones much the larger; pronotum with a small bilobed preapical hood, enlarged behind into a large discal globose one, the latter as in key; elytra widely flattened, surpassing abdomen by nearly half their length; costal area with a single row of very large quadrangular areolæ; osteola absent.

One of the two known North American species occurs in the eastern states.

404 (651). *GALEATUS PECKHAMI* (Ashmead), 1887, 156.

Elongate-oblong. Head and body black; nervures of pronotum and elytra brown or fuscous; areolæ mostly transparent or vitreous, those of the discal hood, lateral carinæ and sutural area clouded; antennæ and legs yellowish, tarsi and fourth antennal darker. First joint of antennæ twice the length of second, third longer than the others united. Elytral margins abruptly narrowed and sinuate near base, broadly rounded at apex. Length, 4—4.5 mm. (Fig. 98).

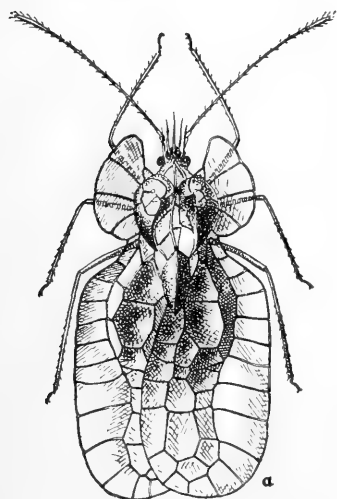


Fig. 98, X 10. (After Drake, Tech. Pub. No. 16, N. Y. St. Coll. For.).

Cranberry Lake, N. Y., Aug. 5 (Drake). A species of northern distribution, ranging from Ontario and northern New England west to Wisconsin (type locality) and Manitoba. Recorded also from Las Vegas, N. M.,⁵⁴ and Japan by Uhler (1904, 354; 1896, 265). Host plants aster and boneset.

II. *CORYTHUCA* Stal, 1873, 119.

Small oblong or subquadrate species having the pronotal hood more or less globose, its apical extension entirely covering the head, reaching in front of tylus; sternal groove not interrupted by a cross carina; bucculæ united in front; antennæ slender, beset with fine bristly hairs, joint 1 twice or more the length of 2, 3 longer than 1 and 2 united, 4 shorter and stouter than 3; pronotum tricarinate, its paranota broad, more or less reflexed, the edges of their side margins with spines; elytra subquadrate, narrowed at base, the costal margin of basal half reflexed, furnished with spines; disk with a tumid elevation on basal third; nervures of upper surface often bearing a few scattered erect spines; osteolar opening present.

⁵⁴Since described by Horvath (1923) as a new species.

The genus is a large one, about 50 species now being known from North America, 24 of which occur in the eastern states. Of them Prof. Comstock has written: "Dainty as fairy brides are these tiny lace-draped insects. One glance at the fine white meshes that cover the wings and spined thorax is sufficient to distinguish them from all other insects, for these are the only ones that are clothed from head to foot in a fine white Brussels net." For convenience our species are separated into three groups.

KEY TO GROUPS OF EASTERN SPECIES OF CORYTHUCA.

- a.* Crest of hood much elevated, nearly or quite three times as high as median carina of pronotum (figs. 100, *a* and *b*, and 102, *b*).
GROUP A, p. 454.
- aa.* Crest of hood lower, never more than twice as high as median carina (fig. 102, *d*).
 - b.* Costal area of elytra without a conspicuous brown basal and apical cross-bar.
GROUP B, p. 458.
 - bb.* Costal area with a well marked basal cross-bar and usually also with an apical one.
GROUP C, p. 460.

Group A.—CORYTHUCA.

This group comprises eight rather large eastern species all having the hood more than twice as high as the front part of median pronotal carina.

KEY TO EASTERN SPECIES OF GROUP A, CORYTHUCA.

- a.* Entire side margins of both paranota and elytra dark brown; front of head, viewed from the side, almost vertical. 405. BULBOSA.
- aa.* Costal area of elytra with a more or less evident basal and apical cross-bar, the space between these usually in great part pale; front of hood declivent.
 - b.* Costal margins of elytra distinctly broadly concave; paranota without spots; cells of hood very large; marginal spines long.
406. CORYLI.
 - bb.* Costal margins of elytra straight or nearly so.
 - c.* Outer half of paranota with a large dark brown spot or stripe; hind margin of apical band of elytra straight. 407. CYDONIÆ.
 - cc.* Outer half of paranota with small brown spots or none; hind margins of apical band of elytra rounded or irregular.
 - d.* Larger, length 3.5 or more mm.
 - e.* Hood very large, subspherical, as wide or wider than high; length 4 or more mm. 408. ASSOCIATA.
 - ee.* Hood smaller, usually less spherical, distinctly higher than wide; length less than 4 mm.
 - f.* Areolæ of hood and paranota opaque, creamy white; length 3.5 mm. 409. ELEGANS.

ff. Areolæ of hood and paranota mostly hyaline.

g. Hood large, globose, evenly rounded dorsally; length 3.5—3.9 mm. 410. PALLIPES.

gg. Hood smaller, not globose, its sides meeting at a sharp angle along median dorsal line; length 3.7 mm.

411. HEIDEMANNI.

dd. Smaller, length not over 3 mm.; crest of hood angulate; apical dark bar of elytra with two or three hyaline cells.

412. BELLULA.

405 (649¾). *CORYTHUCA BULBOSA* Osborn & Drake, 1916, 232.

Subquadrate. Body black; antennæ and legs yellowish, tips of tarsi and fourth antennal brownish; hood fuscous-brown, the center of a few cells hyaline; paranota fuscous, the inner one or two rows of cells hyaline; pronotum blackish, its apical half paler; elytra fuscous-brown, the center of two cells near apex and the inner one or two rows of cells of subcostal area, clear hyaline. Hood very large, its crest nearly three times as high as median carina, compressed near middle, front portion triangular, subvertical; hind portion globose, its cells large, irregular. Median pronotal carina arched, spinose in front and with two or three large cells; lateral carinæ very short and low without areolæ. Costal margins of elytra straight, parallel, their spines short, dark. Length, 4.3—4.6 mm.

Posey Co., Ind., Sept. 22; beaten from its host plant, the bladder-nut, *Staphylea trifolia* L. Probably occurs on that plant throughout the southern half of the State. Its known range extends from New Jersey and Maryland west to southern Indiana. Our largest and darkest species of the genus.

406 (644½). *CORYTHUCA CORYLI* Osborn & Drake, 1917, 299.

Oblong, subquadrate. Body black, apical ventral segment in part brown; antennæ and legs dull yellow; nervures of hood brown, of paranota whitish, cells of both hyaline; elytra with wide basal and preapical brown cross-bars, the intervening space and extreme tip hyaline. Marginal spines long, tipped with black. Hood slightly more than twice as high as median carina, the cells of its globose part very large. Median carina arched and with a single large cell. Length, 2.8 mm.

Vigo Co., Ind., June 12, swept from its host plant, the hazel-nut, *Corylus americana* Walt. Newfoundland, N. J., July 6 (Davis). Recorded heretofore only from Maryland and Virginia.

407 (639¼). *CORYTHUCA CYDONIÆ* (Fitch), 1861, 25.

Oblong or subquadrangular. Body black; abdomen with apex and sometimes the sides in part, dull yellow; antennæ and legs yellow, tarsi and fourth antennal in part darker; hood with nervures and part of the areolæ brownish; paranota yellowish with large brown spot each side; elytra with basal and preapical fuscous-brown cross-bars, the latter

with two or three small indistinct transparent cells, apex hyaline. Hood abruptly compressed at middle, hind portion globose with large cells, front portion subtriangular with smaller ones. Median carina of pronotum elevated and with one row of cells, the two middle cells divided by a small nervure. Elytra with costal margins very slightly concave, their spinules very short. Length, 3.5 mm. (Fig. 99).

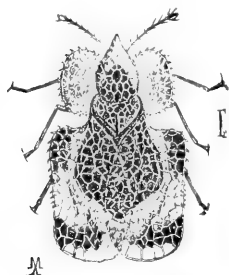


Fig. 99, X 9.
(After Comstock).

Southern two-thirds of Indiana, frequent, April 25—Sept. 23. Beaten from *Crataegus*. Probably occurs throughout the State. Sherborn, Mass., Sept. 20 (*Frost*). Ranges from Ontario and New England, west to North Dakota and probably over most of the United States, though not recorded south of Maryland. Occurs on various species of Roseaceæ, as quince, choke-berry, *Crataegus*, *Amenchier*, etc. The *C. crataegus* O. & D. is a synonym.

408 (649%). *CORYTHUCA ASSOCIATA* Osborn & Drake, 1916a, 14.

Subquadrate. Body black; antennæ, beak and legs dull yellow; nervures of hood brownish-yellow, the centers of the areolæ, hyaline; paranota with one or two small brown spots, the cells hyaline; elytra with a broad basal and apical cross-bar, the latter with two or three large median cells and the outer halves of the apical row, hyaline; sutural area and elevations in great part brownish. Paranota large, reniform, reflexed, convex at middle. Hood strongly compressed near middle, globose hind portion nearly spherical, about as wide as high. Median carina arched and with two rows of cells. Spines on outer margins conspicuous. Length, 4—4.2 mm.

Parke and Putnam counties, Ind., May 13—Oct. 17. Yaphank, N. Y.; Lahway, Palisades and Schooley Mts., N. J.; Jamison City, Pa. (*Davis*). Ranges from New York west to southern Indiana and south to Georgia and Mississippi. Food plants, wild cherry, peach and kindred trees and shrubs. The *C. spinulosa* Gib. (1918, 79) is a synonym.

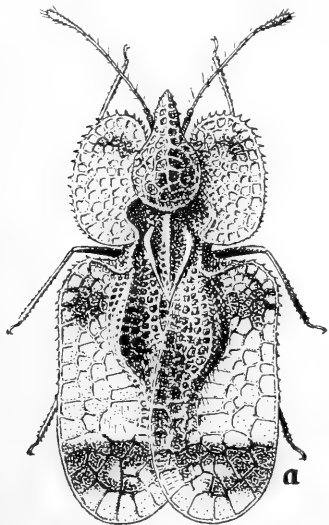
409 (—). *CORYTHUCA ELEGANS* Drake, 1918, 89.

Elongate, subquadrate. Body black; antennæ and legs yellow; nervures of hood and paranota brown, in part fuscous, areolæ creamy-white, opaque; elytra with pale brown to fuscous basal and apical cross-bars, the clear cells in latter subopaque, not hyaline. Hood higher than the length of median carina, its crest more or less angulate and cells twice the size of those of paranota. Median carina arched and with two rows of cells. Spines along margins small, numerous, tipped with black. Length, 3.5 mm. (Fig. 102, a).

Wanakena, N. Y., Aug. 1—7 (*Drake*). Types from Colorado. Known also from Ontario and Michigan. Occurs on willow and the balsam poplar, *Populus balsamifera* L.

410 (—). *CORYTHUCA PALLIPES* Parshley, 1918a, 82.

Oblong, subquadrate. Body black; antennæ, beak and legs brownish-yellow; hood and paranota with nervures brownish, cells hyaline; apical half of paranota with a small vague brown spot; elytra with basal and preapical brown cross-bars, the latter enclosing two or three large hyaline areolæ, extreme apex in part hyaline. Hood more than twice as high as median carina, its cells large. Median carina highest in front, its basal cell very large; front half of lateral carinæ feebly elevated, with three or four cells. Length, 3.9—4.1 mm. (Fig. 100).



Cranberry Lake, N. Y., July 4 (*Drake*). Plattsburg, N. Y. (*Davis*). Known only from Ontario, New England and New York. Food plants, yellow birch, *Betula lutea* Michx., and willow.

The *C. cyrta* Parsh. and *C. betula* Drake, 1918, 86, are synonyms.

411 (—). *CORYTHUCA HEIDEMANNI* Drake, 1918, 87.

Oblong, subquadrate. Body black; antennæ, legs and nervures of upper surface brownish-yellow; pronotum dark brown; paranota with a small submarginal brown patch in front of middle; elytra with rather broad basal and subapical cross-bars, and narrow sutural margins brown or fuscous. Hood wedge-shaped, strongly compressed in front of middle, its hind portion sub-

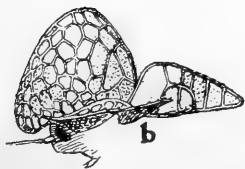


Fig. 100, X 14. *b*, lateral view of hood and median pronotal carina. (After Drake Tech. Pub. 16, N. Y. St. Coll. For.).

globose, with large cells and a few small spines on sides. Pronotum with median carina one-third as high as hood, lateral carinæ shorter, not reaching hood. Paranota with margins broadly rounded, their spinules very short. Elytra with costal margins nearly straight, costal area with three irregular rows of rather large cells and some smaller ones near base. Length, 3.7 mm.

Cranberry Lake, N. Y., Sept. 16 (*Gerhard*). Gibson states

that it is a common species in the Adirondacks around Cranberry Lake. The *C. borealis* Parsh. (1918a, 92) is a synonym.

412 (—). *CORYTHUCA BELLULA* Gibson, 1918, 93.

Oblong-subquadrate. Body black; antennæ, beak and legs pale reddish-brown; nervures of hood, disk of pronotum, one or two small submarginal spots on paranota, basal and apical bands and spot on each elevation of elytra, brown; apical cross bar of elytra with two or three large central cells and apical row of smaller ones, hyaline. Hood more than twice as high as median carina of pronotum, its cells large and crest forming an obtuse angle. Median carina low, not arched, its length less than that of hood. Marginal spines short, not crowded. Length, 3 mm.

Ithaca, N. Y., Sept. 10 (*Gerhard*). Types taken at Tiffin, Ohio, on *Crataegus*. Recorded also from Cranberry Lake, N. Y., on alder.

Group B.—CORYTHUCA.

This group comprises four small species having the crest of hood never more than twice as high as median carina, and elytra wholly devoid of dark basal or apical cross-bars or with only faint traces of such bars.

KEY TO EASTERN SPECIES OF GROUP B, CORYTHUCA.

- a. Cells of the globose portion of hood larger than those of the paranota.
- b. Larger, length 3.5 or more mm.
- c. Color above wholly milky-white except a fuscous spot on tumid elevations of elytra; hood depressed above just behind the middle. 413. *CILIATA*.
- cc. Color pale straw-yellow with no fuscous marks on elytra; hood not flattened, constricted about the middle, globose portion wider than long, the cells very large. 414. *PALLIDA*.
- bb. Smaller, not over 2.5 mm.; hood only slightly higher than the median carina; elytra with traces of basal and apical cross-bars, the cells toward apex very large. 415. *FLORIDANA*.
- aa. Cells of globose portion of hood not larger than those of paranota; median carina as high as hood; length, 3 mm. 416. *GOSSYPIL*.

413 (638). *CORYTHUCA CILIATA* (Say), 1832, 26; I, 348.

Elongate-subparallel. Body black; antennæ and legs yellowish, tarsi and fourth antennal darker; color of upper surface as in key. Hood only slightly higher than median carina, its height less than half its length, narrowed but not constricted in front of middle. Median carina moderately elevated throughout its length, and with two rows of cells; lateral carinæ also elevated, with one row of cells. Length, 3.7 mm.

Common in Indiana wherever the sycamore grows. Occurs throughout the year, hibernating beneath bark of sycamore and nearby cover, and in spring and summer feeding upon its foliage, often causing the leaves to wilt and become whitened. Known as the "sycamore lace-bug," and ranges from Quebec and New England west to the Rocky Mountains and southwest to Alabama. Occurs also on ash, hickory and mulberry.

414 (638¼). *CORYTHUCA PALLIDA* Osborn & Drake, 1916, 230.

Subquadrate. Body brownish-black, sides of sterna and last ventral dull yellow; antennæ and legs yellow, tarsi and fourth antennal darker; nervures of upper surface straw-yellow, the cells hyaline; elytra with a vague pale brownish band at base. Beak reaching beyond middle of mesosternum. Paranota long, reniform, strongly convex at middle. Hood as in key. Median pronotal carina arched, spinose, with two large cells and several small ones. Cells of apical half of elytra distinctly larger than basal ones. Length, 3.8—4.1 mm.

Knox and Posey counties, Ind., April 25—May 6; taken on May-apple, *Podophyllum peltatum* L. Ranges from Maryland and Virginia west to southern Indiana and Tennessee and southwest to Mississippi and Arizona. Its recorded food plants are linden and mulberry.

415 (646). *CORYTHUCA FLORIDANA* Heidemann, 1909, 236.

Short and broad, subquadrate. Body black; antennæ, beak, sides of sternal sulcus and legs yellow. Nervures of upper surface mainly yellowish, cells hyaline, a few brown dots on the hood; base of elytra sometimes with traces of a brown cross-bar and a pale brown spot on each elytral elevation. Hood constricted at middle, the globose hind portion less than one-half higher than the arched median carina, its areolæ large. Paranota obtusely rounded in front, reflexed, and with three rows of rather large cells. Median carina highest at middle and with a single row of cells. Cells of apical half of costal and subcostal areas of elytra much larger than those at base. Length, 2.3—2.5 mm. (Fig. 101).



Fig. 101. X 12.
(After Heidemann).

Dunedin, Fla., Dec. 30—Feb. 9; beaten from foliage of button-bush and oak along the borders of a wet hammock and from a pile of dead leaves of cabbage palmetto. The types were from Bartow, Biscayne Bay and Crescent City, Fla., and it is recorded only from that State. Our smallest species of the genus.

416 (647). *CORYTHUCA GOSSYPHII* (Fabricius), 1794, 78.

Oblong to subquadrate. Body black; apical ventral segment brownish-yellow; antennæ, legs and beak pale yellow; nervures of upper surface white, the cells hyaline; a small submarginal spot near middle of paranota, another on each tumid elevation of elytra, some small vague ones on hood, a curved line on median carina and traces of cross-bars on apical half of elytra, pale brown. Hood about as high as and shorter than median carina, its globose portion wider than long, the cells small. Median carina arched and with two rows of cells; lateral carinæ much lower, without cells. Elytra with cells of basal and apical portions rather large, subequal in size, marginal spines longer than in *floridana*. Length, 2.8—3.2 mm.

Cape Sable and Marco, Fla., Feb. 20—March 9. Taken by sweeping *Hibiscus* and other plants along the margins of tide-water bayous. Recorded from Biscayne Bay and Miami. Ranges from New York to Florida, the West Indies and Central America. Occurs on cotton and other Malvacea; also on castor beans.

Group C.—*CORYTHUCA*.

In this group the crest of hood is never more than twice the height of median carina, and the elytra usually have a well marked dark cross-bar at base and another at or very near apex (fig. 103). The group comprises 12 species and two varieties from the eastern states.

KEY TO EASTERN SPECIES OF GROUP C, *CORYTHUCA*.

- a*. Edges of side margins of paranota and elytra almost devoid of spinules; hood triangular, concave, rather than constricted at sides (fig. 102, *c*). 417. *MOLLICULA*.
- aa*. Edges of paranota and elytra with distinct spines.
 - b*. Elytra with numerous dark spots, these often very faint, those on apical half usually united to form two more or less evident cross-bars; hood about twice as high as median carina.
 - c*. Smaller, length less than 3.5 mm.; lateral carinæ of pronotum low throughout, without areolæ; cells of elytra small, milky-white, only their centers hyaline. 418. *MARMORATA*.⁵⁵
 - cc*. Larger, 4 or more mm.; lateral carinæ curved, elevated, each with two areolæ; cells of elytra large, wholly hyaline. 419. *BACCHARIDIS*.
- bb*. Elytra with a dark cross-bar at base and usually another near apex; hood usually less than twice as high as median carina.
- d*. Elytra with only a dark basal cross-bar, the apical one wanting or represented by a mere trace.
- e*. Hood almost twice as high as median carina, the latter feebly

⁵⁵The Van Duzee (1917, 214) "Pennsylvania and District of Columbia" records of *C. decens* Stal. should, according to Drake (1926, 379), be referred to *C. marmorata* Uhl., as *decens* is a Central American species not known in the United States.

- arched; cells of elytra yellow or brownish-yellow. 420. ULMI.
ee. Hood very little higher than median carina, over twice as long as high; median carina strongly arched; cells of elytra hyaline. 421a. var. MALI.
id. Elytra with both basal and apical dark cross-bars, the intervening area pale.
f. Hood, viewed from the side, long and low, very little higher than median carina.
g. Smaller, length less than 3.5 mm.; apical dark bar of elytra ill defined, occupying only the apical fourth; paranota with small dark spot or none. 421. ARCUATA.
gg. Larger, 4 or more mm.; apical dark bar well defined, occupying the apical third; paranota with distinct dark spot. 422. PRUNI.
ff. Hood, viewed from the side, more elevated, crest rounded, usually nearly twice as high as median carina.
h. Larger, length 4 or more mm.; cross-bars of elytra dark fuscous-brown, the apical one with two or three large hyaline cells; front of hood nearly vertical. 423. ÆSCULI.
hh. Smaller, not over 3.7 mm.; front of hood oblique or declivent, not subvertical.
i. Cross-bars of elytra pale brown, the basal one extending forward to humeral margin; hood, viewed from the side, twice as long as high; median carina lower than tumid elevation of elytra. 424. PERGANDEL.
ii. Cross-bars of elytra dark brown or fuscous, the basal one not reaching humeral margin; hood less than twice as long as high; median carina as high as or higher than elevations of elytra.
j. Hood nearly twice as high as median carina, its cells more than twice as large as those of paranota.
k. Areolæ of apical half of elytra whitish, subopaque, much smaller than in *contracta*; front margin of apical dark bar not curved up the sutural area. 425. JUGLANDIS.
kk. Areolæ of apical half of elytra clear hyaline, much larger than in *juglandis*; front margin of apical dark bar curved forward at middle along the sutural area. 426. CONTRACTA.
jj. Hood but slightly higher than median carina, its cells less than twice the size of those of paranota.
l. Median carina strongly elevated; apical cross-bar of elytra well defined and with a large hyaline spot near middle. 427. EXIGUA.
ll. Median carina much less elevated; apical bar poorly defined, very few of its cells wholly clouded. 428. CELTIDIS.

417 (649 $\frac{1}{8}$). CORYTHUCA MOLLICULA Osborn & Drake, 1916a, 12.

Oblong, slightly narrowed behind. Body black; antennæ, beak and legs dull yellow; cells of upper surface whitish-hyaline, veins faintly yellow; veins of bulbous crest of hood, a small vague spot on paranota,

an interrupted band at base and near apex and spots on discal elevations of elytra, fuscous-brown. Hood scarcely twice as high as and longer than median pronotal carina, its front portion compressed with sides concave. Paranota broadly rounded, margins minutely ciliate, cells smaller than those of hood. Median carina of pronotum feebly arched in front, slightly sinuate behind, and with a large cell in front and two at middle; lateral carinæ short and low. Costal margin wholly devoid of spines or ciliæ; cells of costal and subcostal areas larger than those of hood. Length, 3.5 mm. (Fig. 102, c).

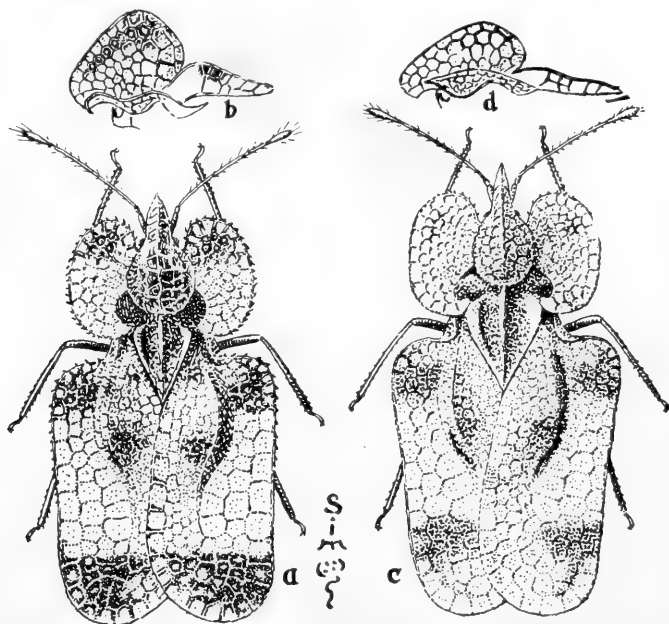


Fig. 102. a, *Corythuca elegans* Drake; c, *C. mollicula* O. & D. X 16; b and d, lateral views of hood and median carina, respectively, of same. (After Drake, Tech. Pub. No. 16, N. Y. St. Coll. For.).

Ramsey, N. J., May 21 (*Barber*). Described from Michigan; ranges from New England west to Montana and Vernon, B. C., and southwest in the coastwise states to South Carolina and Florida. Breeds on willow and poplar, hibernating beneath leaves and rubbish on the ground. The *C. salicis* O. & D. (1917, 298) and the *C. canadensis* Parsh. (1919, 18) are synonyms.

418 (645). *CORYTHUCA MARMORATA* (Uhler), 1878, 415.

Oblong. Body black, the sides of sterna brownish; antennæ and legs yellow, tarsi darker; nervures of upper surface typically brown or fuscous, the cells milky-white; elytra usually with small fuscous or brown spots, arranged in four transverse rows, those of the two apical rows usually connected to form two narrow cross-bars separated by a

single transverse row of partially hyaline cells; these elytral spots often vague, sometimes almost wholly obsolete. Hood compressed at middle, its cells but slightly larger than those of paranota. Median pronotal carina feebly arched and with two rows of cells. Spines along margins short, numerous, close-set. Length, 3.2—3.4 mm. (Pl. IV, fig. 6).

Common in the southern half of Indiana, May 20—Oct. 13; not taken but doubtless occurs in the northern counties. Beaten from white oak and swept from asters, goldenrod and other Compositæ. Dunedin, Fla., March 14—April 27; swept from herbage in low moist grounds. Recorded from Ft. Myers and Lake Worth, Fla. Ranges from Ontario and New England west to the Pacific, and southwest to Florida and New Mexico. Known as the “chrysanthemum lace-bug,” and breeds on ragweed, chrysanthemums and allied Compositæ, often doing much damage to the cultivated forms. Weiss and Lott (1924a) state that in New Jersey it is very injurious to wild asters, and the sea-side goldenrod, the eggs, up to 150 in number, being placed in the tissues or along the veins and midribs of the under surface of the leaves. The young feed in colonies on the lower surface and are often attended by an adult female. Hussey (1922, 23) mentions it as: “By far the most abundant Tingid in Michigan, occurring in Berrien County in almost unbelievable numbers on goldenrod, but rarely taken on other plants.” Parshley (1919, 20) describes a variety *informis* from Vernon, B. C., and Truro, Nova Scotia, which in his later key (1923, 700) he separates from *marmorata* by its having “shorter elytra, the discal elevations extending to middle,” in *marmorata* not reaching middle.

419 (—). *CORYTHUCA BACCHARIDIS* Drake, 1922, 37.

Elongate, subquadrate. Body dark reddish-brown or black, the apical ventral segment paler; antennæ and legs dull yellow; nervures of hood and elytral elevations fuscous-brown, those of paranota and elytra straw-yellow, cells hyaline; elytra with fuscous spots which usually are so merged as to form very indistinct basal and apical cross-bars. Antennæ with numerous very long hairs. Margins of paranota furnished with a double row of spinules; those of costal and basal margins of elytra with a single row. Hood slightly broader than high, its areolæ much larger than those of paranota. Tumid elevations of elytra very large, rounded. Length, 4—4.2 mm.

Key West, R. P. Park, Ft. Myers and Dunedin, Fla., Nov. 23—April 14. The most common *Corythuca* about Dunedin and at the Park, where it occurs on the shrubby white-flowered

Compositæ, *Baccharis halimifolia* L. Described from Paradise Key and Miami, Fla., from specimens taken on *Baccharis* and probably confined to that genus of plants, four of which occur in the State.

420 (—). *CORYTHUCA ULMI* Osborn & Drake, 1916, 231.

Oblong, subquadrate. Body black; last two ventrals brown; antennæ and legs dull yellow; nervures mostly pale brown; spots on paranaota very small or obsolete; pronotum brown, its posterior third paler; elytra with a vague brown basal cross bar. Hood less than twice as high as median carina, less than twice as long as high, its apical half strongly compressed, and cells more than twice as large as those of paranaota. Costal margins of elytra feebly concave. Length, 3.3 mm.

Charleston, S. Car., Aug. 14 (*Gerhard*). Described from Lisbon, Ohio. Known also from Connecticut, Maryland, Virginia, New York and South Dakota. Occurs on elm, *Ulmus americana* L., and probably of wide distribution.

421 (639). *CORYTHUCA ARCUATA* (Say), 1832, 27; I, 350.

Oblong or subquadrate. Body black; legs and antennæ dull yellow, the fourth antennal and tips of tarsi brownish; nervures above creamy-white or yellowish, those on hood often darker, cells hyaline; pronotum brown, paler at tip; cross-bars of elytra dark brown, front one interrupted, the apical one irregular, often obscure, its central portion largely hyaline. Hood low, over twice as long as high, compressed at middle, the globose hind portion subdepressed above and with large cells. Median carina arched in front and with two rows of areolæ. Length, 3—3.3 mm. (Fig. 103).

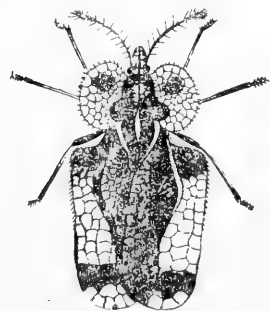


Fig. 103, X 11. (After Uhler).

Common throughout Indiana, more so in the southern counties. Found at all seasons, hibernating beneath bark and fallen leaves and occurring in summer mainly on white and chestnut oaks, often doing much injury to the foliage. Ranges from Quebec and New England west to North Dakota and Colorado and southwest to Alabama and Texas. Not as yet recorded from Florida, but probably occurs in the northern counties. Uhler (1884, 284) mentions it as "occurring, sometimes in great numbers, on the leaves of several kinds of oaks, occupying the under side of the leaves, like all its congeners, laying its eggs next the midrib and veins, and

remaining attached there by its rostrum, drawing the sap from midsummer until the frosts begin to be felt in autumn." For life history see Morrill (1903).

421a (—). *CORYTHUCA ARCUATA* MALI Gibson, 1918, 98.

Distinguished from *arcuata* only by the absence of the apical dark bar of elytra, which is either wholly lacking or represented only by a tinge of brown on the nervures, and one or two clouded cells. Length, 3.1—3.7 mm.

Occurs throughout Indiana, Feb. 13—Sept. 18; on the former date beneath bark of apple. Described from New Jersey and at hand from Staten Island, N. Y., Lahaway and Dennison, N. J., May—September (*Davis*). Taken on wild rose and beaten from oak. Occurs with *arcuata* probably throughout its range. Drake (1921, 54) reduced it to a variety and states that it "breeds on various species of oak, apple and occasionally on hard and soft maple."

422 (640¼). *CORYTHUCA PRUNI* Osborn & Drake, 1916, 231.

Elongate, subquadrate. Body black; legs and antennæ dull yellow; nervures of upper surface straw-yellow, the cells hyaline; paranota with one or two small brown spots; disk of pronotum, except the tip, and broad basal and apical cross-bars of elytra, dark brown, the apical bar enclosing two large hyaline cells, those in apical row also in part hyaline; sutural area flecked with brown. Hood twice or more longer than high, but little higher than median carina, scarcely constricted, its bulbous portion higher than wide, the cells twice or more the size of those of paranota. Median carina evenly arched, with one large basal cell in front of two rows of oblong ones. Costal area with three rows of cells, those of inner row the largest. Spines of margins few and very short. Length, 4—4.2 mm.

Washington, D. C., and Plummer's Island, Md., June—July (*Davis*). Its known range extends from New England west to southern Michigan and south to North Carolina. Occurs on wild cherry, *Prunus scrotina* L., and probably of much wider distribution than the records show. Resembles *æsculi* in size and color, but easily separated by the long low hood, lower median carina and shorter marginal spines. The *C. pyriformis* Parsh. (1920, 81) is a synonym.

423 (649½). *CORYTHUCA ÆSCULI* Osborn & Drake, 1916, 232.

Elongate, subquadrate. Body black; antennæ, beak and legs dull yellow; nervures of hood and paranota fuscous-brown, the cells in part hyaline; paranota with a large median submarginal brown spot; pronotum dark brown, the tip paler; elytra with wide basal and apical cross-

bars and discoidal area dark brown, the apical bar enclosing three large hyaline cells. Hood abruptly compressed at middle, hind portion globose, wider than long, its areolæ large, more than twice the size of those of paranota. Median pronotal carina arched in front and with a single large basal cell, behind which are two rows of smaller ones. Costal area of elytra broad, with three rows of large cells. Length, 4—4.2 mm.

Southern half of Indiana, common, April 11—Sept. 29; beaten from buckeye, *Æsculus glabra* Willd., and sifted from beneath dead leaves on wooded slopes. Dunedin, Fla., April 11—20; beaten from horse-chestnut; the first record for that State. Henderson, Ky., April 29 (*Marshall*). Recorded only from Ohio, Illinois and Kentucky, but probably occurs on various species of *Æsculus* throughout their range. In color this species closely resembles *cydonia*, but it is much larger and the hyaline cells of the solid brown apical bar are three times as large as there.

424 (640). *CORYTHUCA PERGANDEI* Heidemann, 1906, 10.

Subquadrate. Body black, the apical ventral segment and margins of prosternum pale; antennæ and legs dull yellow; nervures of upper surface pale brown, the cells of hood and paranota hyaline, or brown with hyaline centers; pronotum, except tip, and elytra, except space on costal area between the basal and apical cross-bars, pale brown, the cross-bars wide, their cells mostly brown with small hyaline centers; the preapical bar with two or three central cells wholly hyaline, as are also those of the apical row. Hood longer than high, compressed at middle, the bulbous hind portion small, spherical, its cells but little larger than those of paranota. Median pronotal carina low, but feebly arched and with about six small areolæ. Tumid elevation of elytra prominent, rounded. Spines of margins very short. Length, 2.8—3 mm. (Fig. 104).

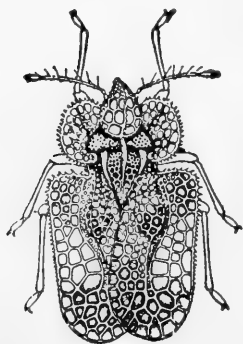


Fig. 104, X 12.
(After Heidemann).

Washington, D. C., numerous stations in New York and New Jersey, and Clayton, Ga., June—October (*Davis*); taken mostly on alder; one specimen, "Staten Island, Feb. 26," by sifting. Ranges from Ontario and New England west to Wisconsin and Kansas and south to Georgia. Recorded also from Texas and California by Gibson (1918, 91), who states that "the known food plants include hazel, elm, crab-apple, black alder and sweet birch."

425 (649). *CORYTHUCA JUGLANDIS* (Fitch), 1856, 466.

Subquadrate. Body wholly black; legs and antennæ dull yellow; nervures of upper surface thick, in great part yellow, those of crest of

hood fuscous, the cells subopaque; a small spot on paranota and basal and apical cross-bars of elytra dark brown, the latter with two or three large central areolæ and part of the apical row whitish subopaque. Hood one-half longer than high, strongly compressed at middle. Median carina low, arched at base and with a large basal cell and a row of small ones above. Tumid elevations of elytra relatively small. Length, 3.3—3.5 mm.

Schooley's Mt., N. J., and Egg Harbor and West Point, N. Y., May 20—June 4 (*Davis*). Ranges from New England west to Kansas and southwest to Texas. Not as yet identified from Indiana, but doubtless occurs on its food plants, walnut, butternut and linden, in many parts of the State. The smaller size, paler brown cross-bars of elytra and whitish subopaque cells distinguish it from *contracta*, its nearest ally.

426 (645¼). *CORYTHUCA CONTRACTA* Osborn & Drake, 1916, 230.

Averaging larger than *juglandis*. Color much the same, last ventral brown at middle; median carina of pronotum with a dark curved cross-bar at middle; cross-bars of elytra fuscous-brown, the apical one curved forward from middle each side along the sutural area, cells of the space between them clear hyaline, vitreous and much larger, with veins distinctly thinner than in *juglandis*. Hood lower, its areolæ more than three times the size of those of paranota. Elytra somewhat tapering behind. Spines of margins fewer and shorter than in *juglandis*. Length, 3.5 4 mm.

Sherborn, Mass., Oct. 25 (*Frost*). Egg Harbor and Atlantic and Cumberland counties, N. J., May—July (*Weiss*). Lake Waccamaw, N. Car., April (*Brimley*). Ranges from New England west to Illinois and southwest to North Carolina. Occurs on walnut, pecan, butternut and linden. The *C. parshleyi* Gib. (1918, 83) is a synonym. Drake (Ms.) states that *contracta* is a synonym of *juglandis*, but numerous specimens received from Weiss show them to differ as set forth above in key and descriptions.

427 (—). *CORYTHUCA EXIGUA* Drake, 1918, 83.

Subquadrate. Body dark brown; under surface with a yellowish tinge; antennæ and legs pale yellow; pronotum, nervures of hood, a small submarginal spot on paranota, sutural area, two cross-bars and hind portion of elevations of elytra, fuscous-brown; nervures of paranota and pale areas of elytra white, the cells hyaline; apical cross-bar with three or four large median cells, and those of terminal row just behind them, hyaline. Hood about three times as long as high. Paranota very long, semi-elliptical, their margins with numerous short spines. Median pronotal carina with two rows of cells, lateral carinæ widely separated from hood, each with two or three cells. Costal margin of elytra straight, its spines numerous, very short. Length, 3.4 mm.

Lake Waccamaw, N. Car., June 9 (*Brimley*). This is the type and only known locality.

428 (649¼). *CORYTHUCA CELTIDIS* Osborn & Drake, 1916, 227.

Oblong or subquadrate. Body black, the last ventral in part brown; antennæ and legs pale yellow, tarsi and fourth antennal slightly darker; nervures of upper surface mostly white, those of paranota yellowish, flecked with fuscous. Disk of pronotum dark brown, the posterior fourth white. Elytra with two incomplete dark fuscous cross-bars, the basal one interrupted, the apical one narrow and oblique, leaving the cells of inner apical angles whitish subopaque, those of the space between the bars clear hyaline. Hood nearly twice as long as high, about one-half higher than median pronotal carina, the latter low, sinuous, not arched and with a large basal cell in front of two rows of smaller ones. Length, 3.5—3.7 mm.

Dearborn Co., Ind., Sept. 16; taken by scores on hackberry (*W. S. B.*). New Brunswick, N. J., Aug. 10 (*Wciss*). Communipaw, N. J., on *Celtis*, Aug. 8 (*Davis*). Ranges from Maryland and New Jersey west and south to Indiana and South Carolina. Occurs on hackberry, *Celtis occidentalis* L. The low unarched median carina and the white nervures and incomplete apical cross-bar of elytra distinguish this species from *juglandis* and *contracta*. A variety, *mississippiensis*, which feeds on the southern hackberry, *Celtis mississippiensis* Bosc., has been named by Drake (1925, 36). It is somewhat larger (4 mm.) with larger hood, more arched median carina and darker markings than the typical form, and is known from Tennessee, South Carolina, Georgia and Mississippi.

III. STEPHANITIS Stal, 1873, 119.

Small oval species having the hood much as in *Corythuca*, but less compressed in front and reaching back to middle of pronotum; paranota widely and strongly reflexed; median carina of pronotum elevated, almost as high as hood, lateral carinæ abbreviated; margins and upper surface of paranota and elytra without hairs or spines; elytra gradually and widely expanded from the base, their tips broadly rounded. One introduced Japanese species occurs in the eastern states.

429 (652). *STEPHANITIS PYRIODES* Scott, 1874, 440.

Elongate-oval. Body black; antennæ and legs pale yellow, the tarsi fuscous; nervures of hood, disk of pronotum, except backward extension and an oblique spot on median carina, fuscous; elytra with a fuscous cross-bar at basal third and another at apical fourth, these con-

nected by a curved fuscous stripe along each sutural area, both bars and stripes formed only by the darkened nervures and slightly darker cells; nervures of remainder of upper surface straw-yellow, the cells clear hyaline. Antennæ filiform throughout, finely and sparsely pilose, first joint three times the length of second, third longer than the others united; fourth slightly longer than first and second united. Structural characters as under generic heading. Length, 3.1—3.5 mm. (Pl. IV, fig. 8).

Newark and Riverton, N. J., September (*H'ciss*). Recorded in this country only from New Jersey, Pennsylvania and Washington, D. C. Known as the "azalea lace-bug," and probably introduced from Japan on evergreen azaleas. The nymphs and adults feed on the under surface of the leaves, abstracting the sap and causing the upper surface to become whitened.⁵⁶

IV. LEPTOBYRSA Stal, 1873, 119.

Small oval species having the antennæ very slender, basal joint exceeding apex of head, twice as long as second, third more than twice as long as the others united; head with five rather short spines; hood small, triangular, compressed, occupying only the anterior third of pronotum, but extending completely over the head; hind portion of pronotum abbreviated, its tip obtuse; carinæ all entire, the median one slightly higher than hood; elytra very broad, nearly twice as long as abdomen, narrowed at base, their tips broadly rounded. Van Duzee (1917, 216) has, in my opinion, erroneously made this genus a synonym of *Stephanitis*. Two species are known from the eastern states.

KEY TO EASTERN SPECIES OF LEPTOBYRSA.

- a. Larger, length 3.6 mm.; elytra with a vague brownish transverse band in front of middle. 430. RHODODENDRI.
- aa. Smaller, not over 3.2 mm.; elytra with only three cross nervures dark. 431. BLATCHLEYI.

430 (653). LEPTOBYRSA RHODODENDRI (Horvath), 1905, 567.

Broadly oval, strongly dilated behind. Head, under surface and disk of pronotum black, shining; nervures of upper surface straw-yellow, the cells hyaline; an oblique spot on median pronotal carina and some of the nervures at basal third of elytra fuscous-brown, the latter forming a vague brownish cross-bar; antennæ, bucculæ and legs pale dull yellow, the tarsal claws and apical half of fourth antennal darker. Paranota semi-elliptical, strongly reflexed. Elytra widening from the base, their areolæ large. Length, 3.5—3.8 mm. (Fig. 105).

⁵⁶For life history see Dickerson & Weiss, Ent. News, 1917, 101.

Lakehurst and Newfoundland, N. J.; Fairfax Co., Va.; Beltsville, Md., and Bloomsburg, Pa., June 15—Sept. 3 (*Davis*).

South Orange and Springfield, N. J., July 23—Sept. 9 (*Weiss*).

An introduced European species, ranging in this country from New England west to Ohio, and south to North Carolina. Van Duzee records it also from "Fla.," but it is not included in the Barber list, and his record probably should be referred to *blatchleyi*. Occurs on laurels, *Kalmia*, and rhododendrons, often doing much damage. The *L. explanata* Heid. (1908, 105) is a synonym.

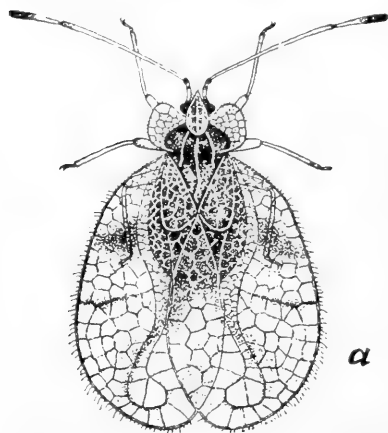


Fig. 105, X 12. (After Heidemann).

431 (—). *LEPTOBYRSA BLATCHLEYI* (Drake), 1925, 37.

Oval, dilated behind. Body brown; antennæ and legs dull yellow, fourth antennal and tarsi fuscous; nervures of upper surface mostly straw-yellow, the cells clear hyaline; carina along crest of hood, curved line on median carina and three cross nervures of elytra, piceous-brown; front half of pronotum reddish-brown, posterior half and discoidal area and elevations of elytra creamy-white. Hood small, compressed triangular, its sides with two rows of cells. Paranota small, reflexed, rounded both in front and behind. Median carina almost as long and high as hood and with two rows of cells, arched near base, thence evenly declivent to the obtuse apex. Elytra strongly narrowed at base, thence gradually widely expanded backward; costal area with two rows of cells at base and five at widest part; discal elevations high and narrow. Crest of hood, margins of paranota and elytra fringed with very fine hairs; upper surface of pronotum and elytra with similar erect hairs. Other characters as under generic heading. Length, 2.8—3.2 mm.

Dunedin, Fla., Feb. 14—April 17. Beaten from bunches of Spanish moss, swept from foliage along the bay front and the margin of a dense hammock, and sifted from bases of clumps of grass. In one specimen almost all the nervures are fuscous-brown.

V. *CORYTHAICA* Stal, 1873, 120.

Small elongate-oval species having the joints of antennæ of the same relative length as in *Corythuca*; hood elongate, curved downward over the head, narrowed in front, its crest carinate,

with a single row of large cells each side; paranota narrow, strongly reflexed and with a single row of cells; pronotum tricarinate, the carinae nearly parallel, the median one usually slightly the higher; elytra, macropterous form, much surpassing the abdomen, the costal area with cells larger towards apex than at base; in brachypterous form, elytra about two-thirds the length of macropterous, the pronotum much reduced and flattened. The genus is represented by several species in tropical America and by two in the eastern states.

KEY TO EASTERN SPECIES OF CORYTHAICA.

- a. Subcostal area with two or three irregular rows of cells; discoidal area without a fuscous spot. 432. BELLULA.
- aa. Subcostal area with three regular rows of small cells; discoidal area with a fuscous spot near apex. 433. FLORIDANA.

432 (—). CORYTHAICA BELLULA Bueno, 1917a, 19.

Elongate-oval. Body, legs, beak and antennae pale brownish-yellow, tip of beak and tarsi blackish; upper surface dull grayish-white, the nervures in great part dull yellow; carina of hood fuscous-brown. Hood with basal portion broader, rounded behind and with two rows of cells, its carina continuous with median one of pronotum. Antennae with joints 1 and 2 shortest, 3 longest, 4 stouter, setose and subclavate. Elytra in macropterous form oval, the costal margin broadly curved, strongly reflexed, costal area with a single row of cells, subcostal area long, narrow, curved and with two or three irregular rows of cells; discoidal area reaching apical third of elytra, narrowed at each end, its margins elevated to form carina-like sutures with those of subcostal and sutural areas. Brachypterous form oval, with cells of elytra much smaller and sutural area almost obsolete. Other characters as under generic heading. Length, macropterous form, 2.2 mm.; brachypterous, 1.9 mm.

White Plains, N. Y. (*Gerhard*). Known only from White Plains, the type locality where, says Bueno (*loc. cit.*), "it occurred only on a sloping grassy meadow going up from a rich marshy swale in a field, among fine low grasses much intermingled with moss." Here it was taken by sweeping close to the ground, from April to September, but was most common in June. Bueno states that the general color "ranges from a light gray, nearly white, through darker gray and brownish to nearly black."

433 (—). CORYTHAICA FLORIDANA sp. nov.

Elongate-oval or fusiform, strongly tapering both before and behind, widest across middle of elytra. Above pale brown; median carina of hood and its cross veinules, cross veins of elytra and a distinct spot on apex of each discoidal area fuscous; basal portion of pronotum, legs and an-

tennæ pale straw yellow; under surface dark brown. Antennæ as in *bellula*. Paranota and basal portion of pronotum distinctly narrower than there. Sides of paranota sinuate at middle, carinæ of pronotum of equal height throughout. Elytra conjointly narrowly oval, slightly surpassing apex of abdomen, their costal margins broadly curved from base to apex, not sinuate, much narrower and less reflexed than in *bellula*; discoidal and subcostal areas also much narrower than there, each with three regular rows of small crowded cells. Length, 2 mm.

Dunedin, Fla., March 6; one specimen sifted from grass roots on the margin of a pond. A darker, much narrower and more strongly tapering form than *bellula*, with cells of paranota, subcostal and discoidal areas much smaller and more crowded.

VI. DICTYONOTA Curtis, 1827, 154.

Small oval species having the head armed with two anteocular divergent spines and two slender ones on vertex; bucculæ widely separated in front exposing the base of beak; antennæ very stout, the joints of nearly equal thickness, rugose and setose; pronotal hood transverse; paranota wide, narrowed behind, somewhat reflexed and concave above; lateral carinæ of pronotum low, each with a single row of areolæ, median one somewhat higher, often with part of a second row; elytra without discal elevations, costal and discoidal areas subequal in width, the former with two, the latter with three rows of areolæ; osteola absent. Represented in this country by a variety of *Dictyonota tricornis* (Schrank), a European palæarctic species.

434 (637%). DICTYONOTA TRICORNIS AMERICANA Parshley, 1916a, 163.

Oblong-oval. Head and disk of pronotum fuscous-black; nervures of elytra brown, areolæ mostly grayish-white; legs and body beneath dark brown; antennæ blackish-brown. Hood small, transverse, covering base of vertex, with two or three rows of cells. Paranota narrowed behind, with three or four rows of cells. Discoidal area reaching nearly to apex of abdomen, its bounding veins elevated, the inner one curved, disk with three irregular rows of cells. Ventrals with apical half finely shagreened. Other characters as under genus heading. Length, 3 mm.

Recorded only from Eastport, Machias and Roque Bluff, Me., July 15—26.

VII. GARGAPHIA Stal, 1862, 324.

Small or medium elongate-oblong species, having the head usually armed with five spines of variable lengths, three on the front between the eyes and two on occiput; first and second

antennals stout, first and fourth usually subequal in length, three times or more the length of second, third more than twice as long as the others united; pronotum with hood small, compressed, covering base of head; paranota rather widely expanded, reflexed, not produced or angulate in front; pronotal disk with three low subequal carinæ; elytra widely flattened, surpassing abdomen by nearly half their length, their margins narrowed and rounded near base; rostral groove deep, sides parallel to middle coxæ, then closed by a sinuous cross carina, behind which the groove is much widened; osteolar opening distinct. About 25 species are known, five of which occur in the eastern states.

KEY TO EASTERN SPECIES OF GARGAPHIA.

- a. Head with basal spines long, distinctly visible in front of hood; outer margins of paranota more or less rounded, not angulate at middle; length, 4 or more mm.
- b. Joint 1 of antennæ dull yellow; paranota with margins broadly rounded and with but three or four rows of cells.
- c. Apical angle of discoidal area of elytra with apex at middle; hood slightly lower than median carina. 435. *TILÆ*.
- cc. Apical angle of discoidal area with apex on the outer side; hood slightly higher than median carina. 436. *AMORPHÆ*.
- bb. Joint 1 of antennæ black; paranota with margins narrowly rounded and with five rows of cells at the widest part. 437. *SOLANI*.
- aa. Head without basal spines, or if present very short, not visible in front of hood; outer margins of paranota distinctly angulate; length, less than 3.5 mm.
- d. Costal area of elytra, at widest, part with four rows of cells; joint 1 of antennæ dull yellow. 438. *ANGULATA*.
- dd. Costal area of elytra with not more than three rows of cells; joint 1 of antennæ, except tip, dark brown. 439. *BIMACULATA*.

435 (654). *GARGAPHIA TILÆ* (Walsh), 1864, 408.

Elongate-oval. Body black, covered with a whitish bloom; last ventral in part brown; antennæ, bucculæ, sides of sternal groove, beak and legs, dull yellow, fourth antennal and tips of tarsi dark brown; nervures of upper surface straw-yellow, the cells hyaline; pronotum black, pubescent, its posterior prolongation pale; elytra usually with a vague blackish cross-bar in front of middle, this formed mainly of darkened nervures. Head with five long acute spines. Paranota broadly rounded, moderately reflexed, each with four irregular rows of cells. Discoidal area coarsely, closely punctate, not quite reaching middle of elytra, usually with seven rows of cells. Length, 4.2—4.8 mm.

Kosciusko, Marion, Vigo, Lawrence and Posey counties, Ind., April 22—Sept. 22; probably occurs throughout the State.

Food plant, the bass-wood or linden, *Tilia americana* L., but occurs also on red-bud, *Cercis canadensis* L., sycamore and wild cherry. Ranges from New England west to South Dakota, Colorado and Kansas, and south to Virginia and North Carolina. The *G. fasciata* Stal (1873, 125) is a synonym.

436 (654a). GARGAPHIA AMORPHÆ (Walsh), 1864, 409.

Form slightly broader than in *tiliæ*, color much the same, the dark cross-bar of elytra usually more distinct. Paranota with three rows of larger cells. Hood smaller, narrower, slightly higher than median carina. Discoidal area with five rows of cells, more widened and more rounded toward apex than in *tiliæ*, its apical angle nearer the outside than middle, thus making the angle more obtuse; costal margin less parallel than in *tiliæ*, slightly sinuate behind middle. Length, 4.2—4.5 mm.

Posey Co., Ind., May 11—June 2; swept from the false indigo, *Amorpha fruticosa* L. The types of Walsh were found on the same plant. Recorded from Illinois, Virginia, North Carolina and Mississippi.

437 (658). GARGAPHIA SOLANI Heidemann, 1914, 136.

Elongate, subparallel. Body, anterior two-thirds of pronotum and joints 1, 2 and 4 of antennæ, piceous-black; legs yellow, the tarsi darker; nervures of upper surface brownish-yellow, sometimes in part blackish, cells hyaline. Hood large for the genus, four times as long as wide, its crest slightly higher than that of median carina. Paranota as in key, their margins, as well as carinæ of pronotum thickly pilose with long erect hairs. Pronotum coarsely and closely punctate, its carinæ arched, each with one row of large cells. Costal area of elytra with three to five rows of large cells, its transverse nervures blackish. Length, 4—4.2 mm.

Apple Grove, Ohio, Aug. 17 (*Gerhard*). Swannanoa, N. Car., Oct. 17 (*Brimley*). Known as the egg-plant lace-bug, as it often does much damage to that vegetable.⁵⁷ Ranges from Maryland west to Missouri and southwest to Texas and Arizona. Not as yet recorded from either Indiana or Florida, but probably occurs in both States. Frequent in southern Ohio on the horse nettle and other Solanaceæ.

438 (657). GARGAPHIA ANGULATA Heidemann, 1899, 301.

Broadly oval. Color much as in *tiliæ*, the pronotum densely pubescent; elytra without a premedian dark cross-bar, but discoidal areas each with a brown spot on apical half. Front of head with very short, blunt whitish spines. Paranota with four rows of areolæ at the widest point, their margins densely fringed with long hairs. Length, 3.3—3.5 mm. (Fig. 106; Pl. IV, fig. 7).

⁵⁷See Fink, Bull. 239, U. S. Dept. Agr.

Fort Montgomery, N. Y., July 26 (*Davis*). Vienna, Va., Aug. 26 (*Weiss*). Ranges from New England and New York south and west to Missouri, Alabama and Arizona. Known to injure beans to some extent, but its principal food plant is said by McAtee to be Jersey-tea, *Ceanothus americanus* L.

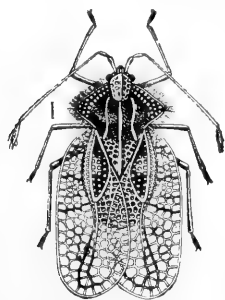


Fig. 106, X 9.
(After Heidemann).

439 (—). *GARGAPHIA BIMACULATA* Parshley, 1920a, 271.

Elongate-oval. Head and body black, the sterna whitish-pubescent; margins of bucculae and sternal groove white; antennae with first and fourth joints, in great part, dark brown, second and third reddish-brown; legs and beak dull yellow, the tarsi darker; nervures of upper surface straw-yellow, the cells hyaline; carina of hood and front portions of pronotal carinae dark brown,

anterior three-fourths of pronotum blackish, thickly clothed with white pubescence; triangular posterior fourth of pronotum and discoidal areas of elytra dull white, the latter each with a triangular brown spot on apical third. Fourth joint of antennae one-half longer than first. Margins of paranota distinctly angulate behind middle, their edges fringed with long hairs. Carinae of pronotum each with one row of cells, the median one slightly higher than hood. Costal area of elytra with three rows of areolae at middle, two at each end. Length, 2.7—3 mm.

Dunedin, Fla., Oct. 25—March 28; taken in the axil of leaf of thistle and swept from herbage in low moist soil. Described from Biscayne Bay, Fla., and known only from that State.

VIII. *GELCHOSSA* Kirkaldy, 1904, 280.

Small, elongate, subparallel species having the antennae slender, first joint three to five times the length of second, third longer than the others united, fourth slightly longer than first; head with three to five spines; hood compressed, not bulbous behind, occupying only the anterior third of pronotum and covering only the occiput; pronotum tricarinate, the carinae percurrent, each with a single row of cells; paranota narrow with not more than two rows of cells; elytra without tumid elevations, constricted about the middle, extending much beyond tip of abdomen; costal area with one to four rows of hyaline cells, subcostal area often very narrow, with one to three rows of smaller cells; discoidal area not reaching middle of elytra; sternal groove not interrupted. Three species are recorded from the eastern states. They occur mainly on plants

of the family Leguminosæ, and were formerly known under the name *Leptostyla* Stal, a preoccupied name.

KEY TO EASTERN SPECIES OF GELCHOSSA.

- a. Costal area of elytra with a premedian black cross-bar; joint 3 of antennæ shorter than pronotum, 1 twice as long as 2; elytra widest at basal third; length, 2.2 mm. 440. CLITORIÆ.
- aa. Costal area without premedian dark cross-bar; joint 3 of antennæ as long as pronotum, 1 three or more times as long as 2.
 - b. Nervures of costal area of elytra white; basal third of costal area with a single row of large rectangular cells; elytra widest near apex; length, 2.7 mm. 441. OBLONGA.
 - bb. Nervures of costal area brown, or fuscous; basal half or more of costal area with an outer row of large cells and an inner row of smaller ones; elytra as wide across discoidal area as at apex; length, 3 mm. 442. HEIDEMANNI.

440 (661). *GELCHOSSA CLITORIÆ* (Heidemann), 1911, 180.

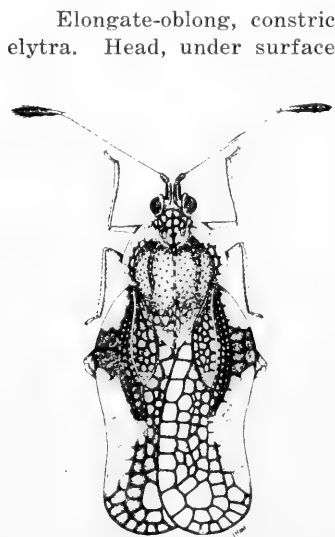


Fig. 107, X 20.
(After Osborn & Drake).

Elongate-oblong, constricted at humeri and again near middle of elytra. Head, under surface, disk of pronotum, subcostal area and a broad premedian bar on costal area of elytra, black; reflexed margins of paranota and basal fourth of costal margin of elytra white; carinæ and triangular tip of pronotum, nervures of preapical third or more of costal area of elytra, legs and third antennal straw-yellow; discoidal area and apical fourth of elytra fuscous, the latter with two or three large hyaline cells; first and second antennals brown; fourth fuscous. Head with a stout median curved spine and two smaller ones below. Hood, viewed from the side, compressed, carinate above and with two vertical rows of cells in front of several larger ones. Median carina of pronotum arched and in front almost as high as hood. Paranota narrow, reflexed and with two rows of cells. Costal area with two rows of cells. Length, 2.1—2.3 mm. (Fig. 107).

Crawford Co., Ind., Aug. 1—30; common locally on bush clover, *Lespedeza*, butterfly pea, *Clitoria mariana* L., and other legumes, along high wooded slopes. The known range extends from Massachusetts west to southern Michigan and Tennessee and south to South Carolina and Arkansas. Van Duzee (1917) makes *clitoria* a synonym of *L. constricta* Champ. China compared Indiana specimens with the type of *constricta* and found the latter to be broader, head wider, its apex pale; hood glo-

bose, not compressed; elytra less strongly constricted, scarcely widening again toward tips.

441 (659). *GELCHOSSA OBLONGA* (Say), 1825, 325; II, 248.

Elongate, subparallel. Head, disk of pronotum and under surface black; hood, margins of paranota, tip of pronotum and costal area of elytra white; discoidal and sutural areas and apical fourth of elytra fuscous-brown; legs and third antennal straw-yellow; first antennal brown, fourth fuscous. Head with three long, slender, acute yellowish spines arising from vertex and two shorter ones below (fig. 97, *a*). Third antennal much longer than in *clitoria*. Paranota with a single row of large subquadrate cells. Costal area with one row of cells at base and apex, two for a short distance behind middle. Length, 2.7—2.8 mm.

Marion Co., Ind., June 9—July 23. Swept from herbage in dense upland woods. Ranges from Maryland and Virginia west to South Dakota, Nebraska and Arkansas. Occurs, for the most part, on the hog peanut, *Falcata comosa* (L.), prairie clover, *Kuhmistera*, false indigo, *Amorpha fruticosa* L., and other legumes. The long slender spines of head and wholly white costal margin, with single row of cells at base of costal area distinguish this from the other species.

442 (—). *GELCHOSSA HEIDEMANNI* Osborn & Drake, 1916, 238.

Differs from *oblonga* mainly by the characters given in key. Slightly larger. Nervures of both paranota and costal margins in part dark and the hyaline cells with a yellowish tinge. Spines of head with black tips. First joint of antennæ more swollen. Both pronotum and elytra somewhat wider, the latter with costal margins less parallel in front of the post median constriction. Length, 3—3.2 mm. (Pl. IV, fig. 5).

Long and Staten Islands, N. Y., May 19—Nov. 16 (*Davis*); taken from wild indigo, *Baptisia tinctoria* L. Numerous stations in New Jersey (*Weiss*). Ranges from New England west to Arkansas and south to Louisiana. Not as yet taken in either Indiana or Florida, but should occur in both states. McAtee (1917, 64) mentions it as "extremely common about Washington, D. C., on its food plant, *Baptisia tinctoria* L., which is not only often but usually severely injured by the feeding operations of these little Tingids."⁵⁸

IX. LEPTODICTYA Stal, 1873, 127.

Small oval species having the head armed with five long slender spines; hood small, compressed, triangular, extended over base of head; paranota relatively narrow, with two or three

⁵⁸For life history see Weiss & West, Ent. News, 1924, 56.

rows of cells, both above and beneath, their margins straight or feebly curved; pronotum with all the carinæ entire, feebly elevated; elytra elongate-oval, the reticulation rather close, the discoidal area extending to or slightly beyond middle; subcostal area narrow, with but two rows of small cells. Two of the five known species occur in our territory.

KEY TO EASTERN SPECIES OF LEPTODICTYA.

- a. Side margins of paranota straight; discoidal area of elytra very long, fusiform, reaching tip of abdomen; form elongate-oblong.

443. PLANA.

- aa. Side margins of paranota distinctly, though feebly, rounded; discoidal area reaching only to middle of elytra; form elongate-oval. 444. SIMULANS.

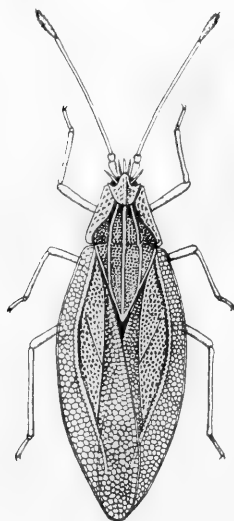


Fig. 108, X 14. (After Heidemann in Proc. Ent. Soc. Wash.).

443 (662). *LEPTODICTYA PLANA* Heidemann, 1913, 1.

Elongate-oblong, very flat. Head, hood, paranota and carinæ of pronotum yellowish; disk of pronotum and elytra olive-gray, the discoidal area of latter with a narrow oblique blackish streak; sutural area with some of the cross nervures fuscous; ventrals pale brown. Spines of head rather long, the three in front reaching only to base of second antennal. Beak scarcely reaching middle coxæ. Joint 1 of antennæ more than twice the length of 2, 3 slender, four times longer than 4. Hood small with rows of minute cells, triangular in front, obtusely rounded behind, the tip of its median carina projected upward. Elytra long and narrow, costal margins broadly feebly rounded; costal area but little broader than discoidal one, the cells small. Length, 3.2 mm. (Fig. 108).

Described from Wistar, Okla., and recorded elsewhere only from Mississippi.

444 (663). *LEPTODICTYA SIMULANS* Heidemann, 1913, 3.

Elongate-oval. Ash-gray, the nervures mostly fuscous; hood and paranota dull white; basal and apical joints of antennæ black, remainder dark brown; legs dull yellow. Spines of head short, the three front ones often matted to appear as one. Hood compressed, triangular, longer than broad, its crest carinate. Elytra gradually widening, with cells increasing in size from base to apex; costal margin very feebly curved, apical one broadly rounded; discoidal area slightly concave, narrowed at each end, finely reticulate and with an oblique fuscous line crossing it just behind middle. Other characters as under generic heading. Length, 3—3.3 mm. (Fig. 109).

Tupelo, Miss., June 20 (*Drake*). Its known range extends from Virginia southwest to Alabama and Mississippi. Nothing has been published regarding its food plants.

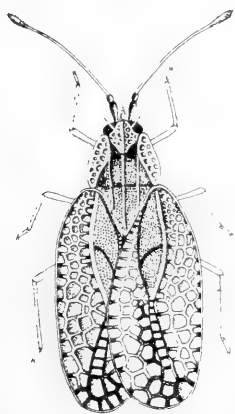


Fig. 109. X 13. (After Heidemann in Proc. Ent. Soc. Wash.).

X. ACANTHOCHEILA Stal, 1860, 61.

Elongate-oval Tingids, readily distinguished from others of the tribe by the single percurrent pronotal carina, which extends from apex of the small hood to the subtruncate tip of pronotum, and by the long curved marginal processes or spines of paranota; head without spines; elytra rather strongly dilated, about twice the length of abdomen, the usual areas flattened and but feebly differentiated, the discoidal area not passing middle, its cells much smaller than those of sutural and subcostal ones; paranota narrow, with a single row of cells. Two or three species are known from Central and South America and one from Florida.

445 (664). ACANTHOCHEILA EXQUISITA Uhler, 1889, 143.

Broadly oval. Head with a white carina adjoining eyes each side of vertex; tylus, bucculae and beak dull yellow; pronotum either ochreous or blackish with ochreous veins, median carina whitish; elytra dull grayish-yellow; under surface black; legs testaceous. Antennae testaceous; joint 1 thicker, shorter than head; 2 almost as thick, bristly, subconical; 3 much longer than the others united, slender, set with erect slender hairs; 4 fusiform, longer than 1 and 2 united, bristly with apical half blackish. Paranota with a single row of five quadrangular cells, outer margin armed with six or seven long acute black-tipped spines. Hind lobe of pronotum trapezoidal, its tip whitish, subacute. Clavus and base of corium coriaceous, remainder of elytra subhyaline, cells of corium increasing in size toward apex, the greatest width with six rows. Costal margin armed with about 17 spines, these diminishing in length from base to beyond middle. Veins of upper surface set with minute bristles. Length, 3—3.5 mm.

Originally described from four specimens taken in May at Cape Florida, Fla., and not recorded elsewhere. The single male is "more transparent and has more clean-cut black markings than any of the females" (*Uhler*).

Tribe II. ACALYPTINI tribus novum.

In addition to the characters set forth in the tribal key, the

members of this group have the form oval; hood small, triangular, at most covering only part of the head; eyes coarsely granulated; pronotal and costal margins only moderately dilated; elytra usually dimorphic in length, their texture subcoriaceous. The tribe comprises two of our eastern genera.

KEY TO EASTERN GENERA OF TRIBE ACALYPTINI.

- a. Pronotum tricarinate, the lateral carinæ sometimes faint; head with two diverging spines; hood small, covering the base of head, its apex usually bisinuate. I. ACALYPTA.
- aa. Pronotum with but a single median carina; head with three short blunt spines; hood broad, covering vertex to front of eyes. II. DRAKELLA.

I. ACALYPTA Westwood, 1840, 121.

Small oval species having the antennæ relatively short, basal joint very stout, second much shorter, more slender, third longer than the others united, fourth short, fusiform, longer than first; elytra, in brachypterous form, slightly passing tip of abdomen and usually meeting in a straight line along the suture, in macropterous one surpassing abdomen by one-third their length and overlapping. Two species are known from the eastern states.

KEY TO EASTERN SPECIES OF ACALYPTA.

- a. Costal area with two rows of cells nearly throughout its length; bucculæ contiguous in front; third joint of antennæ about twice as long as fourth. 446. THOMSONII.
- aa. Costal area with a single row of cells, except near base and apex; bucculæ separated in front; third joint of antennæ nearly four times as long as fourth. 447. LILLIANIS.

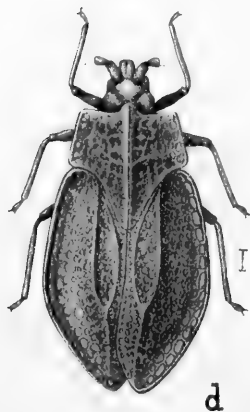


Fig. 110, X 15. (After Drake in Ann. Carnegie Mus.).

446 (637). ACALYPTA THOMSONII Stal, 1873, 122.

Broadly oval, subdepressed. Dull grayish-yellow; under surface and legs reddish-brown. Antennæ reddish-brown, joints 1 and 4 blackish, joint 1 curved, much swollen, twice as long as 2, 3 nearly twice as long as 4. Beak reaching second ventral. Pronotum with lateral carinæ low, distinctly divergent behind, median one percurrent, much the higher; paranota with three rows of cells, two in front of middle, sides nearly straight, subparallel, truncate in front. Elytra with costal margin

broadly rounded; subcostal area with five rows of cells; discoidal area rather broad, extending beyond middle of elytra, with four rows of cells, its outer margins subparallel. Length, 2.5—3 mm. (Fig. 110).

Described from South Carolina. Recorded elsewhere from Massachusetts and Virginia. Occurs in late autumn beneath weed debris along the margins of swales.

447 (637¼). *ACALYPTA LILLIANIS* Bueno, 1916, 39.

Oval or elongate-oval, subdepressed. Head and body beneath dark brown; upper surface a nearly uniform grayish-brown, the areolæ subopaque; legs and antennæ fuscous-brown, the tarsi paler. Hood very small, subtriangular, carinate above and with three rows of cells each side. Pronotum with tip obtuse, lateral carinæ subparallel or slightly divergent behind, reaching hood in front, middle one slightly the higher. Paranota broadly rounded and with two rows of cells. Discoidal area of elytra with four rows of cells, its sides strongly carinate; subcostal area with three or four rows of cells. Length, 2.3 mm., brachypterous form; 3 mm., macropterous one. (Fig. 111).

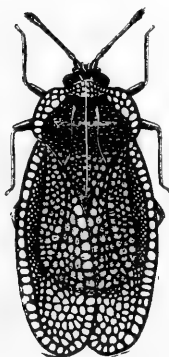


Fig. 111. Macropterous form, X 13. (After Osborn & Drake).

Starke and Lawrence counties, Ind., May 12—June 16. Taken by sifting moss and leaves in upland woods. Ranges from Ontario and New England west to Michigan and south to Maryland and North Carolina. The types were taken by Bueno at White Plains, N. Y., "on a damp and marshy meadow by sweeping close to the ground where the tall tree-like moss, *Climacium americanum* L., grows in clumps." The *A. ovata* O. & D. (1916a, 9) and the *A. grisca* Heid. (1917, 218) are synonyms, based on the brachypterous form.

II. *DRAKELLA* Bergroth, 1922, 152.

Small oval species differing from *Acalypta* mainly by the characters given in generic key. In addition they have the bucculæ contiguous in front; paranota broad, subquadrate, coarsely reticulated; elytra in brachypterous form broadly oval, slightly surpassing tip of abdomen, the main veins prominent; costal area with one row of large cells except near base and apex; discoidal area broad with margins sinuous, reaching apical fourth; osteola absent. The generic name *Fenestrella* O. & D. (1916, 222) is, according to Bergroth, loc. cit., preoccupied. One species is known.

448 (637 $\frac{3}{4}$). *DRAKELLA OVATA* (Osborn & Drake), 1916, 223.

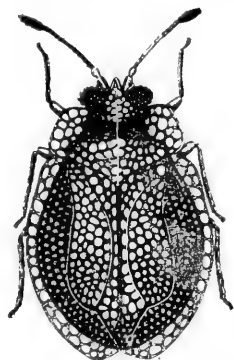


Fig. 112. X 20.
(After Osborn & Drake).

Broadly oval. Pronotum dull yellow tinged with brownish. Elytra brownish, with a yellowish tinge, membrane of cells whitish-hyaline; antennæ and legs brownish-yellow; under surface dark brown. Antennæ less than half the length of body, joint 1 nearly twice as long as 2; 3 more than twice as long as the others united; 4 hairy, longer than 1 and 2 united. Subcostal area with five rows of cells; discoidal area with five or six rows. Other characters as above given. Length, 2 mm. (Fig. 112).

Described from a single brachypterous female taken by Chas. Dury at Cincinnati, Ohio. Known only from that State.

Tribe III. PHYSATOCHEILINI tribus novum.

This tribe comprises small elongate-oval species without pronotal hood and rarely with membranous paranota. The costal margins of elytra are usually but little expanded; the reticulation usually very fine with all the areolæ or cells small and rarely in part hyaline. The osteolar openings are distinct. The tribe comprises ten of our eastern genera.

KEY TO EASTERN GENERA OF TRIBE PHYSATOCHEILINI.

- a. Pronotum with three distinct carinæ, the median one sometimes elevated in front.
- b. Paranota very wide, reflexed against or above the dorsal surface of pronotum.
- c. Reflexed expansions of paranota lying flat against the dorsal surface of pronotum, and in front reaching the lateral carinæ; costal area of elytra flattened and with two or three rows of cells.
 - I. *PHYSATOCHEILA*, p. 483.
- cc. Reflexed expansions of paranota forming a large bulb on each side, these covering the greater part of pronotum and closed within by the elevated lateral carinæ; costal area of elytra narrow with a single row of long subhyaline cells.
 - II. *DICHOCYSTA*, p. 485.
- bb. Paranota not widely reflexed to cover the greater part of pronotum.
- d. Elytra strongly convex, their surface shining; antennæ very stout, the third joint subclavate, densely clothed with short decumbent setæ and thickened toward apex.
 - III. *ALVEOTINGIS*, p. 486.
- dd. Elytra not or but slightly convex, surface dull; antennæ much more slender.
- e. Beak reaching to or beyond middle coxæ; head usually with three to five distinct spines; paranota without thin membranous margins.

- f. Antennæ not clavate, the third joint not more than three times as long as fourth.
- g. Paranota long, narrow, with three rows of very small cells; median pronotal carina raised in front to form a small flat hood. IV. TINGIS, p. 487.
- gg. Paranota with but one row of cells or none; hood indistinct or entirely wanting; form narrow, elongate, somewhat resembling that of *Gelchossa*. V. TELEONEMIA, p. 487.
- ff. Antennæ with third segment more or less clavate and more than three times the length of fourth.
- h. Third antennal cylindrical, enlarged near tip; dorsal surface of elytra flat; reflexed side margins of pronotum as high as the carinæ. VI. MELANORHOPALA, p. 490.
- hh. Third antennal gradually thickened from the base; dorsal surface of elytra convex; reflexed margins of pronotum lower than the carinæ. VII. HESPEROTINGIS, p. 493.
- ee. Beak not surpassing front coxæ; head without spines, but with a short, obtuse median tubercle; paranota with margins flattened, membranous and with a single row of cells; form oblong, very depressed. VIII. ATHEAS, p. 494.
- aa. Pronotum unicarinate, the median carina only distinct, traces of the others sometimes visible on posterior half.
- i. Paranota represented only by a small pale ear-like appendage at each lateral angle; joint 1 of antennæ one-half longer than 2. IX. PSEUDACYSTA, p. 497.
- ii. Paranota distinct, but very narrow, carina-like, not reflexed; joints 1 and 2 of antennæ subequal in length. X. LEPTOYPHA, p. 498.

I. PHYSATOCHEILA Fieber, 1844, 80.

Small oblong or elongate-oval species having the head furnished with five appressed spines; antennæ rather slender, joint 1 stouter and one-half longer than 2; 3 more slender and longer than the others united, 4 fusiform; middle of apical fourth of pronotum slightly compressed to form a triangular hood-like elevation which projects very little if at all over the base of head; pronotum with carinæ low, entire, its posterior process elongate-triangular with tip acute; elytra much wider than abdomen and surpassing its tip, the discoidal areas reaching beyond their middle; costal areas rather widely flattened and with two or three rows of cells. Five species occur in North America, four in the eastern states.

KEY TO EASTERN SPECIES OF PHYSATOCHEILA.

- a. Beak not extending beyond the apex of the rostral sulcus.
- b. Smaller, length less than 4 mm.; third antennal not enlarged at apex.

- c. Costal area of elytra with two regular rows of cells; beak reaching between hind coxæ. 449. PLEXA.
- cc. Costal area with three regular rows of cells; beak reaching between middle coxæ. 450. BREVIROSTRIS.
- bb. Larger, length 4.5 or more mm.; third antennal slender at base, much enlarged at apex. 451. MAJOR.
- aa. Beak reaching onto second ventral; elytra grayish-brown, the nervures more or less fuscous; costal area with two or three irregular rows of cells. 452. VARIEGATA.
- 449 (665). PHYSATOCHEILA PLEXA (Say), 1832, 27; I, 349.

Elongate-oval. Color a nearly uniform reddish-brown, tinged with yellowish, rarely with reflexed paranota and discoidal area in part fuscous; eyes black; fourth antennal and third tarsal fuscous. Beak reaching between hind coxæ. Hood-like elevation of pronotum, and reflexed paranota very closely and coarsely punctate; remainder of paranota and discoidal areas of elytra finely and closely punctate, the latter with margins slightly elevated. Elytra broadly and regularly curved from the narrow base to the rounded tips, the cells of the costal area rather large, quite regular in form and size, for the most part translucent. Length, 3—3.5 mm. (Pl. IV, fig. 4).

Ashland and Sherborn, Mass., May 2—Nov. 12; taken by sifting (*Frost*). Ranges from Quebec and New England west to Michigan and Illinois and south to Virginia and District of Columbia. The *P. parshleyi* C. & D. (1917a, 155) is a synonym. Bueno has taken *plexa* in September on oak at Yaphank, N. Y., and McAtee on hickory and laurel.

450 (665¼). PHYSATOCHEILA BREVIROSTRIS Osborn & Drake, 1916, 243.

Elongate-oval. Color above and beneath a uniform dull reddish-brown; antennæ and legs of the same hue, the fourth antennal and tarsi darker. Beak reaching between middle coxæ. Hood-like elevation and reflexed paranota a little less coarsely punctate than in *plexa*. Costal area with rows of punctures more regular than there, those of the outer row the larger. Characters otherwise as in *plexa* to which it is very closely related. Length, 3.2—3.5 mm.

Lakehurst, N. J., May 29 (*Davis*). Ranges from Massachusetts and Connecticut west to Ohio and south to Virginia, the records for the most part being for May and June without mention of food plant.

451 (—). PHYSATOCHEILA MAJOR Osborn & Drake, 1917a, 158.

Elongate-oval. Color a nearly uniform dull clay yellow, above very sparsely beset with minute yellowish hairs, beneath thickly clothed with fine silvery pubescence; eyes dark brown; fourth antennal, a cloud on posterior half of pronotum, a cross-bar on middle of elytra and some of

the veins of costal area pale fuscous-brown; femora each with a broad, vague median brownish ring; mesosternum and tarsi fuscous. Joints 1—3 of antennæ dull yellow, 3 about four times as long as 1 and 2 united, its apical fourth feebly but visibly thickened, female, distinctly so, male; joint 4 fusiform, paler at base, slightly longer than 1 and 2 united. Cells of paranota coarse, their margins rugose. Discoidal area of elytra reaching almost to apex of abdomen, its outer margin sinuate; costal area with two or three confused rows of rather large subhyaline cells. Length, 4.5—4.7 mm.

Normal, Ill., May 10 (*Ill. Nat. Hist. Surv. Coll.*). Described from Illinois. Known also from Maryland, Virginia and the District of Columbia.

452 (665½). *PHYSATOCHEILA VARIEGATA* Parshley, 1917a, 166.

Elongate-oval. Pale grayish-brown variegated with fuscous; spines of hood and ends of carinæ dull yellow; reflexed paranota, discoidal areas and veins of costal margin more or less fuscous-brown; antennæ and legs pale reddish-brown, the fourth antennal darker; under surface dull yellowish-brown, sparsely clothed with very short and fine yellow scale-like hairs. First antennal stouter but scarcely longer than second, third more slender than in *plexa*. Paranota less densely punctate than there. Costal area with two or three confused rows of cells. Length, 3.3—4 mm.

Jackson Co., Ind., May 20 (*W. S. B.*). Natick, Mass. (*Frost*). Hewitt, N. J., July (*Davis*). Ranges from New England west to Vernon, B. C., and south to West Virginia. Occurs on white pine. Osborn & Drake regard this form as the *plexa* of Say, but Van Duzee and Parshley disagree with them. As Say's brief description will fit both species and his type is destroyed, the question must remain unsettled.

II. *DICHOCYSTA* Champion, 1898, 33.

Small elongate narrow species having the head armed with five, rather long decumbent spines; beak reaching first ventral; sternal groove uninterrupted; antennæ with joints 1 and 2 very short, stout, 3 more slender, longer than the others united, 4 fusiform; pronotum tricarinate, paranota as in key; elytra with sides subparallel, tips rounded, extending beyond tip of abdomen; discoidal area large, triangular, surpassing middle, its sides elevated. One species is known.

453 (670). *DICHOCYSTA PICTIPES* Champion, 1898, 34.

Elongate, subparallel. Dull brownish-yellow; fourth antennal, bulbs of paranota and cross veins of costal area, in great part or wholly fuscous; elytra with a few small scattered fuscous dots; joints 1—3 of antennæ and legs brownish-yellow; femora and tibiæ with one or two

vague fuscous rings. Pronotum with front margin slightly prolonged at middle, sides parallel; median carina almost concealed between the bulbs, lateral ones visible only behind them. Elytra with cells of costal area variable in size, their centers hyaline; subcostal area with two irregular rows of cells; discoidal area with numerous confused rather coarse cells. Length, 3.2—3.8 mm.

Chiriqui, Costa Rica (*British Mus. Coll.*). Described from Central America and Panama. Recorded from Gainesville, Fla., by Drake. Known also from Arizona. Aside from the very prominent paranotal bulbs, it resembles closely *Telconemia sacchari* (Fab.).

III. ALVEOTINGIS Osborn & Drake, 1916, 245.

Small oval, strongly convex species having the head armed with five spines; eyes large, subglobose, coarsely granulated; beak reaching middle coxæ; pronotal carinæ each with a single row of cells, the lateral ones sinuate; paranota narrow, membranous and with a single row of cells, reflected back nearly against the disk of pronotum; elytra with main nervures elevated; costal area with a single row of hyaline cells; the other areas poorly differentiated. One species is known.

454 (670½). ALVEOTINGIS GROSSOCERATA Osborn & Drake, 1916, 245.



Fig. 113, X 13.
(After Osborn & Drake).

Rather broadly oval, much widened behind the middle. Grayish-brown, darker beneath; head brown; membrane of cells whitish. Joints 1 and 2 of antennæ brown, 3 and 4 fuscous; 1 almost twice as long as 2; 3 nearly twice the length of the others united, more slender toward base than in fig. 113; 4 very short, conical. Antenniferous tubercles large, cylindrical, resembling first antennal. Pronotum with carinæ abbreviated in front, median carina reaching apex of posterior process, separated from the lateral ones by two rows of cells. Elytra broad, costal margin rounded, disk rather coarsely reticulate, discoidal area elongate, narrowed at each end, reaching behind middle and with three or four rows of cells. Other characters as under genus heading. Length, 2.8—3.5 mm. (Fig. 113).

Delaware Water Gap, Pa. (*Van Duzee*).

Described from Orono, Me. Known elsewhere only from New Hampshire and Pennsylvania.

IV. TINGIS Fabricius, 1803, 124.

Small elongate-oval species distinguished as in generic key and having the bucculæ closed in front; head with five rather slender spines; beak reaching beyond middle coxæ; pronotum coarsely punctate, tricarinate, the carina parallel, each with a single row of very small cells; elytra surpassing apex of abdomen, all the cells very small, discoidal areas very long, reaching their apical fourth, their marginal nervures strongly elevated; costal area with three rows of cells, subcostal area with two to three rows. The genus is represented in this country by a single known species.

455 (—). TINGIS NECOPINA (Drake), 1919, 420.

Elongate-oval, narrowed behind. Above pale yellowish-brown, the veinlets with a few darker markings; head and sides of apical third of pronotum, blackish; spines of head whitish; under surface reddish-brown, the prosternum, coxæ, trochanters and femora darker; sides of rostral groove and tarsi tinged with yellow. Joints 1 and 2 of antennæ dark brown, 1 thicker and slightly longer than 2; 3 pale brown, two and three-fifth times the length of 4, more slender than 2; 4 blackish, slightly enlarged toward tip. Length, 3.1 mm.

Known only by a single specimen in the Uhler collection, taken at Bladensburg, Md., July 27, 1890.

V. TELEONEMIA Costa, 1864, 144.

Elongate, narrow subparallel species having the head usually with five short spines; antennæ cylindrical, contiguous at base, joints variable as to species; pronotum tricarinate, the anterior third narrower, middle third much wider and strongly convex, posterior prolongation elongate-triangular, its tip subacute, paranota very narrow, usually reflexed against the sides of disk; elytra much surpassing abdomen, subparallel to middle, feebly constricted at apical third, their tips broadly rounded; discoidal areas extending beyond the middle. The genus is best represented in Central America and Mexico, where 14 species are known. Nine occur in North America, six in the southern states.

KEY TO EASTERN SPECIES OF TELEONEMIA.

- a Subcostal area with two rows of cells.
 - b. Third antennal slightly less than twice as long as fourth; beak reaching front edge of metasternum. 456. NIGRINA.
 - bb. Third antennal nearly four times as long as fourth; beak reaching behind the metasternum. 457. CYLINDRICORNIS.

- aa. Subcostal area with but a single row of cells; third antennal much more than twice the length of fourth.
- c. Discoidal area finely pubescent; costal area with large cells.
- d. Antennæ rather densely shortly pilose; elytra with a large irregular pale spot on discoidal areas. 458. *SCRUPULOSA*.
- dd. Antennæ very sparsely pilose; elytra with dark-brown markings on discoidal and sutural areas. 459. *VANDUZEEI*.
- cc. Discoidal area glabrous; costal area with small or very small cells.
- e. General color dark brown, the elytra with fuscous markings; front margin of pronotum subtruncate, its middle but slightly prolonged forward. 460. *SACCHARI*.
- ee. General color pale brownish-yellow, with darker brown markings; front margin of pronotum bisinuate, its middle forming a triangle which is prolonged forward. 461. *BELFRAGEI*.

456 (671). *TELEONEMIA NIGRINA* Champion, 1898, 41.

Elongate, narrow, subparallel. Body beneath black or piceous, clothed with a short whitish pubescence; upper surface dark gray or brownish-gray; elytra with a few very small blackish spots, the long

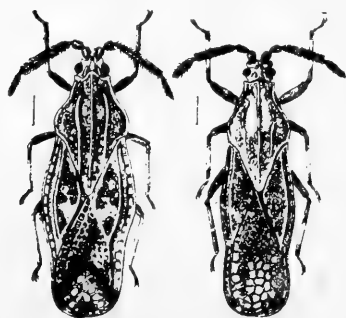


Fig. 114. *Teleonemia scrupulosa* Stal. Fig. 115. *T. nigrina* Champ., X 10. (After Champion).

narrow cells of costal area hyaline, separated by transverse black nervures; antennæ and legs brown; tibiæ with apical halves pale. Head with a short, blunt median spine. Antennæ very stout, joints 1 and 2 short, subequal, thickly pilose, 3 almost twice as long as 4, the latter subconical. Pronotum with front margin truncate; disk finely punctate, its three carinæ low, each with a single row of small cells; paranota with distinct cells. Elytra widest at middle, then slightly constricted, the punctures of discoidal area deep. Apical ventral of female usually with a

large stout, obliquely projecting tubercle each side. Length, 3.2—3.6 mm. (Fig. 115).

Santa Clara Co., Cal., August (*Gerhard*). Ranges from Missouri and North Carolina west and southwest to California, Texas and Mexico. Its known food plants comprise species of *Rhus*, *Adenostegia*, *Sphæralcea*, *Verbena*, *Helenium*, etc. The dull color, short, stout antennæ and tubercles of apical ventral of female make it easily known. The tubercles, however, are said to vary much in size and shape and are sometimes wanting.

457 (—). *TELEONEMIA CYLINDRICORNIS* Champion, 1898, 41.

Elongate-oval, widest behind the middle. Dull brownish-yellow; elytral nervures vaguely mottled with fuscous; antennæ, tips of tarsi, and under surface fuscous-brown; cells of the costal area hyaline.

Frontal spines of head slender, porrect. Antennæ stout, thickly shortly pilose, reaching basal third of elytra; joint 2 slightly shorter than 1, 3 nearly four times as long as 4, the latter longer than 1 and 2 united. Pronotum with median carina elevated, projecting in front, lateral ones prominent, intervals closely, coarsely punctate, reticulate behind. Elytra elongate-oval, tips broadly rounded, costal margin sinuate at basal third; discoidal area with cells large, its marginal nervures prominent; costal area with one row of large cells at base, two beyond middle. Length, 4—4.5 mm.

A neotropical species, described from Central America and recorded in our territory from Illinois and Mississippi.

458 (674). *TELEONEMIA SCRUPULOSA* Stal, 1873, 132.

Elongate, slender, subparallel. Grayish or reddish-brown thickly clothed with very short grayish scale-like hairs; elytra usually with irregular dark blotches on discal area and smaller ones near apex, the interval between these pale subhyaline; legs dull yellow, knees and tarsi tinged with fuscous. Antennæ dark brown, densely clothed with short stiff blackish hairs; joints 1 and 2 subequal, 4 fusiform, one-half longer than either, 3 about twice as long as the others united. Beak reaching front edge of metasternum. Pronotal carinæ rather low, both they and paranota with one row of cells, the latter reflexed but not appressed against pronotal disk. Elytra of the usual form for the genus, the cells of costal area rather large and hyaline, those of the pubescent discoidal areas very small and shallow. Length, 3.3—4 mm. (Fig. 114).

Houston, Tex., Oct. 17 (*Barber*). Brownsville, Tex., Aug. 1, on ebony (*Cornell Univ. Coll.*). A tropical species described from Rio Janeiro, recorded from Key West, Fla., and Texas, and ranging throughout the West Indies, Central America and Mexico. Occurs on mint and mallow.

459 (—). *TELEONEMIA VANDUZEEI* Drake, 1919a, 24.

Elongate, slender. Pale brownish-yellow with darker brown markings; pronotum brown; discoidal area of elytra dark brown or fuscous, faintly pubescent; sutural area with a vague ill-defined preapical transverse band; legs brown, knees darker. Antennæ brown, joint 4 somewhat darker; joint 1 slightly stouter than and subequal in length to 2; 3 slender, nearly three times as long as 4, the latter subequal in length to 1 and 2 united. Beak reaching onto metasternum. Paranota with one row of small but distinct cells. Pronotal carinæ well elevated, each with a single row of cells, the median one raised in front and projecting over vertex. Costal and subcostal areas each with one row of rather large cells. Length, 3—3.2 mm.

Crescent City, Fla., Sept. 7 (*Cornell Univ. Coll.*). Recorded by Van Duzee (1907, 22) from Jamaica as *T. scrupulosa* Stal.

460 (673). *TELEONEMIA SACCHARI* (Fabricius), 1794, 77.

Elongate, narrow, sides subparallel. Dark reddish-brown; narrow side margins of paranota and elytra and pronotal carinæ, alternated with dull yellow and fuscous; nervures of elytra dull yellow, the cells in part fuscous, the membrane with several pale subhyaline ones near apex; bucculæ and sides of rostral groove dull yellow; antennæ and legs reddish-brown, the tarsi and fourth antennal often darker. Third antennal nearly three times the length of fourth. Pronotum sparsely pubescent, its carinæ low, each with one row of cells. Elytra with costal area narrow, its cells long and very narrow. Other characters as in key. Length, 3.7—3.9 mm.

Royal Palm Park, Cape Sable and Key West, Fla., Feb. 22—April 7; frequent on vegetation along the borders of hammocks and tide water lagoons. Recorded also from Lake Worth and Biscayne Bay. A neotropical species, known in this country only from Florida, but ranging south to the West Indies, Mexico and Brazil.

461 (675). *TELEONEMIA BELFRAGEI* Stal, 1873, 132.

Narrowly elongate. Pale dull yellow; pronotal carinæ and elytral nervures often flecked with fuscous; discoidal areas and membrane usually with brown blotches; ventral surface of abdomen brown; antennæ and legs pale brownish-yellow, tarsi black, fourth antennal brown or fuscous. Antennæ very slender, the first and second joints subequal, the third three times the length of fourth. Pronotum finely densely pubescent, its front margin projecting slightly over occiput, carinæ higher than in *sacchari*, each with a row of cells. Discoidal areas and membrane with areolæ fewer and larger than in *sacchari*; costal area with a single row of oblong hyaline cells, the cross nervures in part black or brown. Length, 3.4—3.6 mm.

Istokpoga, Ft. Myers and Dunedin, Fla., Feb. 24—March 30 (*W. S. B.*). Lakeland, Fla., May 6 (*Davis*). Taken by sweeping the French mulberry, *Callicarpa americana* L., by beating in dense hammocks and sifting on the sites of extinct wet-weather ponds. Recorded from Jacksonville, Crescent City, Gainesville, Sanford and Biscayne Bay. Known only from Florida and Texas.

VI. *MELANORHOPALA* Stal, 1873, 130.

Elongate depressed species having the head armed with five long decurved or appressed spines; antennæ stout, subcontiguous at base, joint 1 usually nearly twice the length of 2, 3 longer than the others united, enlarged near apex, 4 short, conical or fusiform; hood wanting, pronotum tricarinate, the

carinae usually lower than margins of pronotum, the backward extension triangular; elytra closely reticulated, the main veins elevated, carina-like; dimorphic in length, in macropterous form widely overlapping with tips broadly rounded, in brachypterous one, slightly overlapping with tips acute, divaricate; discoidal area surpassing middle; costal area usually with but one row of cells, subcostal with two rows. Three species are known from North America, all occurring in our territory.

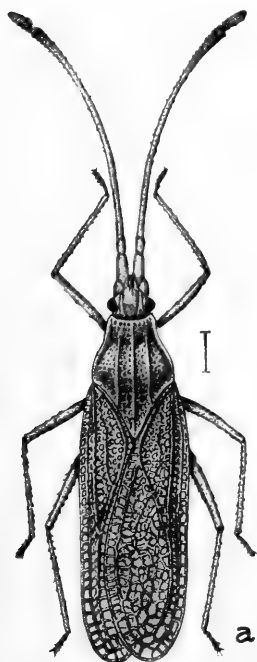


Fig. 116. Male of *M. clavata* Stal. = (*lurida* Stal.), X 10. (After Drake, Ann. Carnegie Mus.).

KEY TO EASTERN SPECIES OF MELANORHOPALA.

- a. Costal area evenly reticulated and with one row of cells; antennae more or less clavate.
 - b. Paranota vertical, their row of cells lateral; apex of hind portion of pronotum acute. 462. CLAVATA.
 - bb. Paranota reflexed against the disk of pronotum, their row of cells dorsal; apex of hind portion of pronotum obtuse. 463. REFLEXA.
- aa. Costal area irregularly reticulated, with two or three rows of cells; color more or less variegated with fuscous; antennae not clavate. 464. INFUSCATA.

462 (667). *MELANORHOPALA CLAVATA* Stal, 1873, 130.

Elongate-subparallel, macropterous form; elongate-oval, brachypterous one. Dull brownish-yellow or grayish-brown; tarsi, fourth antennal, swollen tip of third, and often some of the elytral veins blackish-fuscous or dark brown. Disk of pronotum of macropterous form with median third strongly convex, nearly twice the width of front margin, of brachypterous form flat throughout, its width across humeral angles but little greater than that of apex. Male with body narrower and third antennal but little enlarged at tip; female much broader with tip of antennae distinctly enlarged. Elytra in brachypterous form oval, their sides curved, the divaricate tips surpassing abdomen. Length, 5—6 mm. (Figs. 116 and 117 and Pl. IV, fig. 3).

Marion Co., Ind., June 3—Aug. 14; taken by sweeping herbage in dense woodland and low meadows and by beating foliage of black oak. Hewitt and Westfield, N. J., and Staten Island, N. Y., June—August (*Davis*). Argos and Willow

Springs, Ill., June 23—July 14 (*Gerhard*). Ranges from New England west to Nebraska, Wisconsin and Manitoba. The

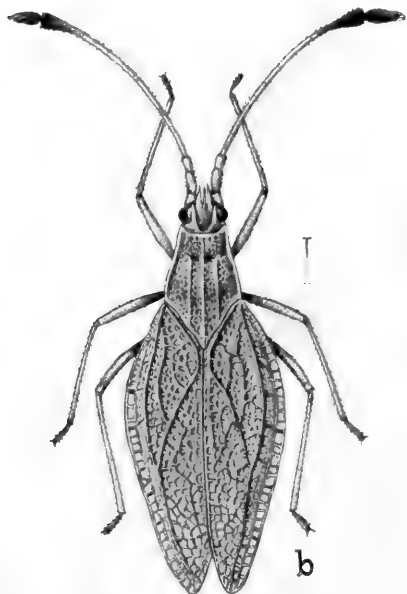


Fig. 117. *Brachypterus* female, X 10.
(After Drake, Ann. Carnegie Mus.).

seven Indiana specimens at hand are all macropterous. Bueno (1908a, 231) took it at White Plains, N. Y., in July and August, "mainly by sweeping in rank weedy places near damp swampy meadows." The only characters used by Stal (1873, 131) in separating his *lurida* from *clavata*, pertain to the antennæ and are sexual rather than specific. His *lurida*, therefore, represents the male of *clavata*.

463 (669). *MELANORHOPALA REFLEXA* sp. nov.

Elongate-oval. Head and pronotum dark reddish-brown; elytra pale fuscous-brown, the main nervures blackish-brown; paranota and costal area dull yellow, some of the cross nervures of the latter fuscous. Joints 1 and 2 of antennæ reddish-brown, 1 stout, visibly curved, twice as long as 2; 3 more than twice as long as the others united, straw-yellow, its apical sixth blackish and feebly swollen; 4 blackish, fusiform, slightly more slender than apex of 3, about as long as 1. Spines of head shorter and stouter than in *clavata*, the median one appressed, not suberect as there. Beak reaching between middle coxæ. Pronotum shorter, the middle of disk more convex than in *clavata*; paranota and apex of hind lobe as in key. Discoidal area bisected by a strong oblique blackish nerve, this forked near middle. Tips of elytra rather broadly obliquely rounded and overlapping, surpassing abdomen by one-third their length. Costal area with a single row of rounded cells, these distinctly smaller than the oblong ones of *clavata*. Length, 6.8 mm.

Marion Co., Ind., June 26; one macropterous female swept from white-top in an open meadow. I at first considered this as *M. uniformis* Stal, but Drake (1926, 376) has placed that species as a synonym of *clavata*. The figure of the type of *uniformis* as shown by him has the apex of hind lobe of pronotum much more acute and the paranota not reflexed as in *reflexa*.

464 (669%). *MELANORHOPALA INFUSCATA* Parshley, 1917b, 19.

Macropterous form—Elongate-oval, widest at middle of elytra. Dull brownish-yellow, the cells of costal area hyaline; fourth antennal and some small scattered spots on elytra, fuscous-brown; legs and remainder of antennæ paler brownish-yellow; femora marked with small vague brownish dots; sides of sternal sulcus whitish; genital plate and sides of ventrals often tinged with fuscous. Joints of antennæ cylindrical, of nearly equal thickness throughout, 1 only about one-third longer than 2, 3 more than twice as long as the others united; 4 fusiform, pilose, about as long as 1. Spines of head closely appressed. Pronotum elongate pentagonal, disk at middle convex with lateral angles obtuse; carinae fully as high as margins, median one percurrent, the others abbreviated in front. Elytra surpassing abdomen by one-fourth their length, gradually slightly widened from base to middle, thence feebly narrowed with margins visibly sinuate, their tips broadly rounded; apical two-thirds of costal area with two or three rows of rather large cells, basal third often with but a single row. Length, 5—6 mm.

Great Falls, Va., Aug. 21 (*Barber*). Recorded only from Virginia and Maryland, where it occurs on bark, foliage and at sap of tulip (*Liriodendron*), and on Jersey tea (*Ceanothus*).

VII. HESPEROTINGIS Parshley, 1917b, 21.

Small oval or elongate-oval species having the head armed with five spines; antennæ stout, third segment clavate, subcylindrical at base and apex; hood very feebly developed, pronotum otherwise as in *Melanorhopala*; elytra moderately convex, the areas limited by carina-like veins; costal area with one to three rows of cells, subcostal with two rows; discoidal area narrow, extending beyond middle; tips of elytra not divaricate in brachypterous forms; osteola distinct. Two species are known from the eastern states and one from Texas.

KEY TO EASTERN SPECIES OF HESPEROTINGIS.

- a. Costal area of elytra with but a single row of cells; beak reaching hind coxæ; antennæ slightly shorter than head and pronotum united. 465. ANTENNATA.
- aa. Costal area with two or three rows of cells; beak reaching middle coxæ; antennæ longer than head and pronotum united. 466. ILLINOIENSIS.

465 (—). *HESPEROTINGIS ANTENNATA* Parshley, 1917b, 21.

Macropterous form—Elongate-oval. Brown, head and pronotum tinged with fuscous; front margin of pronotum, hood, apical half of paranota and apex of hind portion of pronotum, yellowish; membrane of cells milky-white; veinlets of elytra pale brown, those bordering and

within discoidal area darker; under surface chestnut-brown, bucculæ and margins of pleura paler. Antennæ pubescent, joints 1 and 2 brown, 1 stouter and one-half longer than 2; 3 large, clavate, its basal third

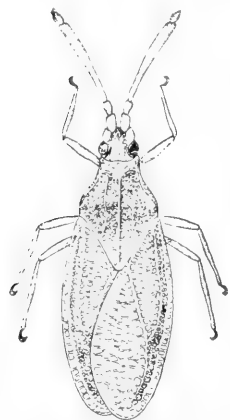


Fig. 118. Female X 8.
(After Parshley).

more slender than 2, apical third fuscous, as wide as the length of 1; 4 fuscous, very small, conical. Pronotum subcylindrical, narrowed in front, its middle third convex, paranota closely reflexed against the sides of disk, front margin curved, slightly elevated to form a collar; carinæ low, median one percurrent. Elytra much surpassing abdomen; costal area reflexed, cells of sutural area rather large. Length, 4.5 mm. *Brachypterous form*—Broadly oval. Pronotum flat, less broadened behind. Elytra but slightly longer than abdomen, costal margin strongly curved, tips narrowly rounded. Length, 3.7 mm. (Fig. 118).

Ranges from Connecticut west to Pennsylvania and south to Washington, D. C., occurring from June to September.

466 (—). *HESPEROTINGIS ILLINOIENSIS* Drake, 1918b, 88.

Form and size of *antennata*. Above uniform yellowish-brown, sometimes tinged with fuscous; under surface and legs brown; tarsi, fourth antennal and apical half of third blackish. Antennæ stout, reaching beyond base of elytra, joint 3 very large, clavate, much longer than in *antennata*; 4 elliptical, one-third longer than 1. Pronotum coarsely punctate; paranota nearly vertical, with one row of cells. Elytra surpassing abdomen, tips broadly rounded; costal area as in key; subcostal with two rows of cells. Length, 4.1—4.6 mm.

Known only from Palos Park, Ill., where it was taken July 8 by Gerhard.

VIII. *ATHEAS* Champion, 1898, 44.

Small oblong or elongate, subparallel depressed species having the head armed with a single obtuse tubercle in front, the antenniferous spines prominent, usually acute; antennæ slender, joints 1 and 2 stouter, 1 twice or more the length of 2, 3 about as long as the others united, 4 fusiform; pronotum tricarinate, its margins very narrow and with one row of cells, the triangular posterior portion rather short with tip obtuse; elytra much surpassing abdomen, oblong-oval or subparallel, their tips broadly rounded; discoidal areas extending beyond middle, subcostal area with one to three rows of cells. Nine nominal species are recognized, four from the eastern states.

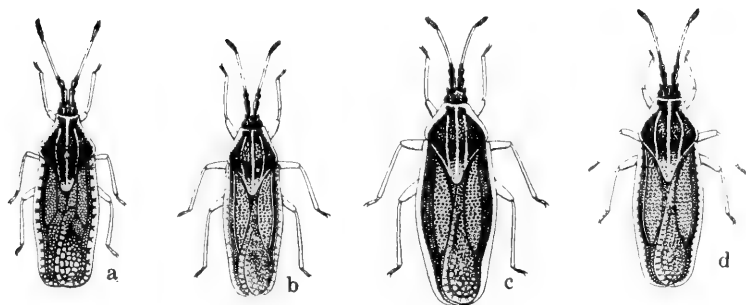


Fig. 119. Species of *Atheas* described by Heidemann; *a*, *insignis*; *b*, *exiguus*; *c*, *austroriparius*; *d*, *mimeticus*. (After Heidemann).

KEY TO EASTERN SPECIES OF ATHEAS.

- a*. Third antennal with only the extreme base black.
- b*. Subcostal area distinctly narrower than the costal one, the latter with cross nervures blackish. 467. *INSIGNIS*.
- bb*. Subcostal area as wide as or wider than the costal one, the latter with cross nervures pale.
- c*. Form very narrow, sides subparallel; elytra feebly sinuate and constricted at apical third; subcostal area with two rows of minute cells. 468. *EXIGUUS*.
- cc*. Form wider, more oval; elytra widest at middle, thence gradually narrowed to the rounded tips; subcostal area with three rows of small cells. 469. *AUSTRORIPARIUS*.
- aa*. Third antennal with basal third black; cross nervures of costal area blackish at inner ends; costal area wider than the subcostal one. 470. *MIMETICUS*.

467 (676). *ATHEAS INSIGNIS* Heidemann, 1909, 232.

Elongate-oval. General color black, in great part thinly covered with a bluish-gray pruinose coating, this most conspicuous on disk of pronotum and under surface; margins of pronotum, costal edge of elytra, legs, bucculae and beak, yellow; apical half of posterior lobe of pronotum, cells of discoidal and base of sutural areas of elytra, grayish-white; cells of remainder of elytra hyaline, the veins blackish; tarsi fuscous. Joints 2 and 4 of antennae black, 1 stouter and twice as long as 2, 3 yellow, black at base, more than twice as long as 4. Pronotum elongate pentagonal, the median third convex, nearly twice as wide as front margin; carinae granulate, the median one percurrent, the others abbreviated in front; paranota narrow, reflexed and with a single row of cells. Elytra elongate-oval, widest at middle, narrowed with margins sinuate toward apex, male, more evenly rounded, female; discoidal area about half as long as elytra, obtusely pointed at apex, with four rows of small crowded cells, which have the appearance of granules, costal area with one row of large oblong cells, the black cross nervures forked; subcostal area with two rows of minute cells. Length, 2.3—2.5 mm. (Fig. 119, *a*).

Vienna, Va., Aug. 18 (*Barber*). Known only from Maryland, Virginia, Mississippi and the District of Columbia where it occurs, June to August, on the pencil flower, *Stylosanthes biflora* (L).

468 (677). *ATHEAS EXIGUUS* Heidemann, 1909, 233.

Elongate, flattened, subparallel. Head, joints 1, 2 and 4 of antennæ, under surface and basal two-thirds or more of pronotum, black; joint 3 of antennæ, apical third of pronotum, carinæ, paranota and elytra pale grayish-yellow, the nervures brownish; bucculæ and legs straw-yellow, last tarsal and claws blackish. Antenniferous tubercles short, acute. Pronotum with median carina percurrent, lateral ones abbreviated in front; disk convex at middle, flattened in front and behind; paranota widest in front. Elytra widest in front of middle, tips broadly rounded; discoidal area widest at middle, reaching apical fourth of elytra, very finely reticulate; subcostal area as in key; costal area with a single row of rather large hyaline cells. Length, 2—2.3 mm. (Fig. 119, *b*).

Sevenoaks, Fla., May 1 (*Van Duzee*). This is the type locality and it is recorded only from that State.

469 (679). *ATHEAS AUSTRORIPARIUS* Heidemann, 1909, 234.

Elongate-oval. Black; paranota and costal area yellowish-hyaline; carinæ and apical fifth of hind portion of pronotum and legs dull yellow; joints 1, 2 and 4 of antennæ black, 3 straw-yellow, narrowly black at base; tarsi fuscous. Pronotum shorter and broader than in the other species, disk feebly convex, closely and deeply punctate; apex of hind lobe obtusely rounded. Elytra as in key, costal area with one row of medium sized cells and some smaller ones near margin; discoidal area very long, reaching tip of abdomen with four rows of cells at widest point. Length, 2.6 mm. (Fig. 119, *c*).

Recorded from Duval Co., Fla., several stations in Mississippi, and Columbus, Tex. Larger and stouter than *mimeticus*, with subcostal area wider than costal one.

470 (678). *ATHEAS MIMETICUS* Heidemann, 1909, 235.

Elongate-oval. Color of *exiguus*, the pronotum more extensively blackish with carinæ pale; basal one-third of second antennal black; nerves of elytra more distinctly brownish. Pronotum broader, carinæ lower; paranota straight, less widened in front; apex of posterior portion wider, more obtuse. Elytra broader, sides feebly but regularly curved from base to tips; costal area distinctly wider, more flattened, with two rows of cells; discoidal area with larger ocellate cells. Brachypterous form shorter, stouter, the elytra not passing tip of abdomen. Length, 2.2—2.5 mm. (Fig. 119, *d*).

Onaga, Kan., Oct. 2 (*Van Duzee*). Albuquerque, N. Mex., Aug. 30 (*Osborn*). Recorded from Wisconsin, Minnesota, Kan-

sas and Mississippi. Occurs on *Desmodium* and other leguminous plants.

IX. PSEUDACYSTA gen. nov.

Small oval species having the head short, porrect, inserted in thorax to eyes, its vertex armed with two short converging spines; antennæ slender throughout, joint 1 about one-half longer than 2, 3 twice as long as the others united, 4 fusiform; pronotum with only a single low median carina, its middle portion strongly convex, the triangular posterior portion acute at tip; paranota represented only by a small pale ear-like appendage at each lateral angle; elytra oval, about one-half longer than abdomen, widest about the middle, their margins feebly curved and tips rounded; costal area broad with three or four rows of large hyaline cells; discoidal area not closed behind, both it and subcostal area closely reticulate with very small cells.

This genus is founded with *Acysta persca* Heid. (1908, 103) as the type. It differs widely from *Acysta* Champ. (1898, 46), the latter having four spines on head, the pronotum tricarinate, the paranota extending along the entire margin of pronotum and the discoidal area closed behind.

471 (680). PSEUDACYSTA PERSEA (Heidemann), 1908, 103.

Oblong-oval. Body beneath, head, pronotum, except front edge and tip of posterior third, and a bar crossing basal third of elytra but reaching only slightly outside the discoidal area, piceous-brown or blackish; remainder of upper surface yellowish-white; legs and antennæ pale yellow, the claws and apical half of fourth antennal blackish. Pronotum subpentagonal, with front side margins obtuse and converging strongly toward apex; posterior portion flat, triangular, acutely pointed; disk finely and densely punctate and with a single entire low median carina. Elytra much surpassing abdomen, their tips broadly rounded; discoidal area long, narrow, not closed behind. Genital segment of male oblong with a small fovea each side. Other characters as under generic heading. Length, 2 mm. (Fig. 120).



Fig. 120, X 15.
(After Heidemann).

Cutler, Fla., April 16 (*Gerhard*). Taken from the foliage of avocados or alligator pears. Recorded by Heidemann and Barber from Eustis, Baldwin, Orlando, Miami and Ft. Myers, Fla., and probably occurs throughout the southern half of the State.

Known elsewhere only from New Orleans, La., where it was taken from camphor trees.

X. LEPTOPHYA Stal, 1873, 121.

Small elongate-oval or subparallel species having the sternal sulcus closed in front, uninterrupted behind; hood wanting; head with short tubercles or obtuse spines; antennæ short, cylindrical, the two basal joints short, subequal, the third longer than the others united; margins of paranota, and often the costal margin, not flattened or reflexed; pronotal carina single, usually with traces of the other two; tip of pronotum acute; elytra surpassing abdomen, their discoidal areas slightly elevated above the costal ones, reaching to or slightly beyond middle, bounded by acute carina-like margins. Five of the six known North American species occur in the eastern states.

KEY TO EASTERN SPECIES OF LEPTOPHYA.

- a. Costal margin of elytra flattened and reflexed, distinct for its whole length; elytra widest across discoidal area, then narrowed toward apex.
- b. Costal margin with two rows of areolæ throughout part of its length.
- c. The two rows of areolæ present only on basal third; third antennal slightly less than twice as long as 1 and 2 united. 472. COSTATA.
- cc. The two rows of areolæ extending to apical fourth; third antennal more than three times as long as 1 and 2 united. 473. ELLIPTICA.
- bb. Costal margin with a single row of areolæ throughout its length. 474. MCATEEL.
- aa. Costal margin not flattened but very narrow and deflexed, replaced by subcostal margin along basal third; elytra subparallel, but little widened across discoidal area.
- d. Larger, length more than 2.5 mm.; third joint of antennæ nearly four times as long as basal joint. 475. MUTICA.
- dd. Smaller, length not over 2.2 mm.; third joint of antennæ less than three times as long as first. 476. ILICIS.

472 (666¼). LEPTOPHYA COSTATA Parshley, 1917b, 16.

Elongate-oval, widest at middle of elytra. Above dull brownish-yellow, the antennæ and legs concolorous; callosities of front lobe of pronotum, some irregular lines on discoidal area of corium and veins of of membrane, fuscous; carinæ on apical fourth of pronotum sometimes whitish; under surface chestnut-brown. Head with two long, appressed yellowish spines. First and second antennals subequal in length, united about half as long as third; fourth nearly twice longer than first. Pronotum with median portion strongly convex, twice as wide as apical margin;

median carina, viewed from the side, percurrent, lateral ones usually evident, but very low on apical and basal thirds, obsolete on middle. Elytra at middle distinctly wider than pronotum, thence tapering to the rounded tips; costal area narrow, reflexed, with a single entire row of small cells and a second row on basal third. Length, 2.7—2.9 mm.

Aberdeen, Miss., June 26 (*Barber*). Marsh Hall, Md., Aug. 3 (*Cornell Univ. Coll.*). Ranges from Maryland and Virginia west to Illinois and Colorado and southwest to Arkansas and Mississippi. Recorded as feeding on witch hazel and ash. The broad elytra, costal area with double row of cells at base and the short third antennal are the distinguishing characters of this species. The *L. distinguenda* Heid. (1917, 218) is a synonym of *costata*.

473 (666%). *LEPTOYPHA ELLIPTICA* McAtee, 1917, 57.

Rather broadly elliptical, widest at middle of elytra. Straw-yellow to pale reddish-brown; callosities on front half of pronotum and fourth antennal black; first and second antennals and tarsi brown or fuscous; legs reddish-brown; under surface, nervures of membrane and in part those of costal margins, brown; collar and bucculae yellowish-white. Upper surface coarsely, closely punctate, the membrane and costal areas with distinct areolae. Pronotum with median third twice as wide as apical one, strongly convex; median carina percurrent, the lateral ones visible only on posterior third. Elytra strongly widened at middle, thence narrowed to the broadly rounded tips. Length, 2.8—3 mm.

Posey Co., Ind., June 4. Its known range extends from southern Indiana south to Georgia, Jacksonville, Fla., and Texas. Occurs in Georgia on *Ilex*. The largest of our eastern species, with costal area wider and more reflexed than in any of the others.

474 (—). *LEPTOYPHA MCATEEI* Drake, 1921, 49.

Elongate-oblong. Pale reddish-brown; a spot each side of apical third and another each side of posterior third of pronotum, fuscous; elytra with nervures of membrane and a large spot near apex of each discoidal area, fuscous-brown; collar and bucculae dull yellow; antennae and legs pale reddish-brown; under surface chestnut-brown. Joint 1 of antennae slightly longer than 2, the latter obconical, 3 nearly four times the length of 1 and 2 united. Pronotum and its carinae as in *elliptica*. Elytra much less widened at middle than there, thence narrowed to the rounded tips, the costal margin very narrow with a single row of very small cells. Length, 2.8—2.9 mm.

Dunedin and Lake Wales, Fla., Nov. 28—April 8; swept from the foliage of the tall scurfy Ericad, *Xolisma ferruginca* (Walt.). The types, taken at Gainesville, Fla., Aug. 13, were found on

the wild olive, *Osmanthus americanus* (L.). Known only from Florida. In this species the elytra are distinctly less widened at middle than in the two preceding, with costal margin very narrow, thus approaching *mutica*.

475 (666). *LEPTOPHYA MUTICA* (Say), 1832, 27; I, 349.

Elongate, subparallel. Dark reddish-brown, the head and apical third of pronotum often with a whitish bloom; thorax with elevations behind collar, and often some blotches on disk, fuscous; elytra with veins of membrane and a vague submedian cross-bar fuscous; collar and bucculæ dull yellow; antennæ and legs fuscous, the apical portions paler. Antennæ much shorter than in preceding species, the third joint scarcely twice as long as first and second united. Pronotum with median third strongly convex; median carina percurrent, traces of the others often visible on posterior third. Elytra but very slightly widened at middle, the costal margins visible only on apical half. Other characters as in key. Length, 2.7—2.9 mm. (Fig. 121).

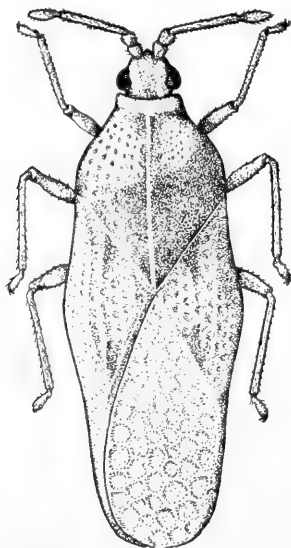


Fig. 121, X 23.
(After Dickerson & Weiss).

Marshall, Marion and Crawford counties, Ind., June 13—Oct. 13. Swept from foliage of ash. Ranges from Quebec and New England west to North Dakota and Nebraska, and south to Georgia, Florida and Texas. Known as the fringe tree lace bug and occurs

on ash and the fringe tree, *Chionanthus virginica* L. Varies much in color, some specimens being almost black. Hussey reports it as rather common in southern Michigan on the seedlings of the white ash, *Fraxinus americana* L., "occurring only on the upper side of the leaves near the midrib." The only Florida record is that of Drake (1918b, 88) without definite station.

476 (—). *LEPTOPHYA ILICIS* Drake, 1919, 420.

Narrowly oblong, subparallel, constricted near base and apex of elytra. Pale to dark reddish-brown, often with small scattered fuscous areas; collar and apex of postmedian process of pronotum sometimes paler; apex of discoidal area and veins of membrane in part fuscous; tarsi fuscous. Antennæ short, stout, cylindrical, joints 1 and 2 subequal, united slightly longer than 4, 3 equal to all the others united. Pronotum with median portion very strongly convex, median carina distinct, lateral ones wholly obsolete. Costal area of elytra with only a few

distinct cells near apex; subcostal area with three or four rows of cells. Length, 2.2 mm.

Lake Wales, Fla., March 31 (*W. S. B.*). Stone Mountain, Ga., June 8 (*Osborn*). Recorded heretofore only from Stone Mountain, where it occurs in June on *Ilcr.* Much smaller and with shorter antennæ than *mutica*.

Superfamily REDUVIOIDEÆ Reuter, 1910, 72.

This superfamily comprises the majority of our predaceous terrestrial Heteroptera. All of them have the front legs more or less modified to form grasping and prehensile organs. They have the head usually more or less cylindrical; ocelli usually present; antennæ 4-jointed (5-jointed in *Pagusus*; 8-jointed in *Rhiginia*), longer than head, the last two joints, except in the Phymatidæ, more slender than the others; beak usually 3-jointed, more or less curved; pronotum and often the head with a transverse groove; scutellum visible; elytra without a cuneus; osteola usually absent; hind coxæ rotatory; tarsal claws without arolia. The superfamily as thus characterized comprises five of our eastern families separated as follows:

KEY TO EASTERN FAMILIES OF REDUVIOIDEÆ.

- a.* Pronotum divided into three lobes; head strongly constricted behind the eyes; elytra, except veins, wholly membranous; apical third of front tibiæ dilated and compressed; front tarsi 1-jointed, raptorial; middle and hind tarsi 2-jointed; length not over 4 mm. Terrestrial, usually hygrophilous; flying in swarms; predaceous.
Family XVI. ENICOCEPHALIDÆ, p. 502.
- aa.* Pronotum not divided into three lobes; length more than 4 mm.
- b.* Joint 4 of antennæ much thickened, clavate or fusiform; front femora very stout, the tibiæ short and retractile (fig. 3, *c*); form short, stout, roughly sculptured. Terrestrial or thamnophilous; predaceous.
Family XVII. PHYMATIDÆ, p. 503.
- bb.* Joint 4 of antennæ slender, not clavate or fusiform; front femora not strongly thickened; form slender, often exceedingly so.
- c.* Prosternum (except in *Carthasis*) with a longitudinal, median, minutely transversely striated, stridulatory groove between the front coxæ and receiving the tip of beak; beak 3-jointed, the first joint usually stout and more or less curved; head with a transverse groove between or behind the eyes.
- d.* Body and antennæ linear or extremely slender; ocelli absent; front coxæ greatly elongated, reaching or surpassing apex of head, their cavities opening forward and downward; elytra, except veins, membranous, the usual divisions of clavus, corium, etc., wanting. Terrestrial or thamnophilous; predaceous.

Family XVIII. PLOIARIIDÆ, p. 511.

- dd.* Form of body and antennæ not as above; ocelli present (except in *Carthasinæ* and *Saicinæ*); front coxæ not greatly elongated, their cavities opening downward; elytra in great part coriaceous, the usual divisions present. Terrestrial or thamnophilous; predatory. Family XIX. *REDUVIIDÆ*, p. 536.
- cc.* Prosternum without a stridulatory groove as in *c*; beak 4-jointed, the first joint very short; head without a transverse groove; front legs raptorial (fig. 6, *m*). Terrestrial or thamnophilous; roving; predaceous. Family XX. *NABIDÆ*, p. 537.

Family XVI. ENICOCEPHALIDÆ Stal, 1860, 81.

Very small slender bugs, having the head porrect, elongate, strongly constricted by a transverse groove just behind the eyes, ocelli present on its hind lobe; antennæ and beak each 4-jointed; pronotum 3-lobed, the lobes separated by strong transverse constrictions; elytra wholly membranous and with few veins; front tarsi 1-jointed, middle and hind ones 2-jointed; prosternum without a stridulatory groove. Only about a dozen species are known, two from the United States. For literature treating of the North American species see Uhler, 1892; Champion, 1898; Johannsen, 1909; Bergroth, 1913a, 1915.

I. SYSTELLODERES Blanchard, 1852, 224.

Species possessing the characters of the family and having the posterior lobe of head subglobose, constricted both before and behind; fourth joint of antennæ slightly shorter and thicker than third; beak not reaching base of head, the first and second joints very stout, third almost as stout, nearly as long as the others united, fourth very short, acute; pronotum longer than wide, middle lobe suborbicular, hind one shorter and wider; elytra narrow, surpassing abdomen, the discal cell open behind. Three species are known, one from Chile, a second from Guatemala and the third from our territory.

477 (684). *SYSTELLODERES BICEPS* (Say), 1832, 32; I, 356.

Elongate, slender. Pale yellow or grayish-brown, strongly shining, very finely pubescent; head, base of beak, antennæ, and front lobe of pronotum often in part darker. Antennæ slender, bristly-hairy, joint 1 stoutest, 2—4 subequal in length, the fourth subfusiform, slightly flattened. Eyes large, coarsely granulated. Ocelli prominent. Middle lobe of pronotum smooth with a fovea or impressed line on disk and another each side; hind lobe very finely, distinctly punctate, its hind margin broadly concave. Scutellum small, triangular, its apical half with a fine median longitudinal carina. Front tibia with apex dilated, compressed and armed with seven stout spines; also with a row of fine setæ

on inner lower side; front tarsus with two stout spines on lower face, and ending in two long claws, the outer one the shorter; the tarsus retractile to form with the tibia a raptorial and prehensile organ. Length, 3—4 mm. (Fig. 122).



Fig. 122. Female
X 13. (After Johannsen).

Putnam Co., Ind., Oct. 17. Dunedin and R. P. Park, Fla., Dec. 9—March 19. One was taken at Dunedin from beneath a board on the margin of a pond; at the Park several at electric light in room, others by sifting weed debris in damp places. Ranges from New England west to Utah and southwest to Florida, Arizona, Cuba and Mexico. Say's type was from Pennsylvania and having been destroyed, the insect was redescribed by Uhler (1892, 181) as *Hymenodectes culicis*. Bergroth (1913a, 265) restored Say's specific name and later (1915, 292) placed it under Blanchard's genus which was founded for a Chilean species. In some specimens the median impression on middle lobe of pronotum is in the form of an entire line, in others only as a central fovea. Johannsen (1909, 1) notes it as swarming and hovering

in the air about six feet above the ground in his garden at Ithaca, N. Y. The swarms were first seen on July 5 and continued until late August, appearing about five o'clock each afternoon and continuing until sundown.

Family XVII. PHYMATIDÆ Laporte, 1832, 14.

THE AMBUSH BUGS.

This family includes a small number of stout-bodied, roughly sculptured Heteroptera of median size having the head small, porrect, bucculæ large, forming a deep groove for the reception of the beak; antennæ 4-jointed, the terminal joint thickened, fusiform; beak apparently 3-jointed, the true first one rudimentary; ocelli present; pronotum with front portion usually strongly declivent, both it and abdomen with margins more or less expanded and upcurved; elytra rather narrow and elongate, their membrane either with numerous veins or closely reticulated; front legs raptorial with coxæ elongate, femora much thickened, tibiæ curved and strongly retractile, tarsi often absent; csteola wanting. Males with sixth segments of

abdomen, above and beneath, closely united and enclosing the genital plate.

Only about 80 species of the family are known, 14 from North America. They are all predaceous in habit, hiding themselves in the heads of flowers, especially Compositæ, where they await the coming of bees and other nectar-seeking insects. When the prey is within reach the bug makes a quick stroke with its sabre-like fore tibiæ, draws the victim within reach of its beak and then leisurely sucks it dry. The family is separated into two subfamilies, each represented in North America by a single genus. The literature is widely scattered, the chief works being a monograph by Handlirsch, published in 1897, and Champion, 1898.

KEY TO NORTH AMERICAN GENERA OF PHYMATIDÆ.

- a.* Tarsi of front legs present but very small, concealed in repose in a groove on the inner side of tibiæ; scutellum small, triangular, enclosed between the bases of the elytra (Subfamily Phymatiniæ). I. PHYMATA.
- aa.* Tarsi of front legs absent; scutellum continued back to the end of the abdomen, in repose covering the greater part of the elytra (Subfamily Macrocephalinæ). II. MACROCEPHALUS.

I. PHYMATA Latreille, 1802, 247.

The species of this genus have the head short with vertex produced forward and sometimes upward, its apex usually deeply notched; antennæ closely received in grooves, these passing back above the eyes and beneath the side margins of pronotum; pronotum with disk very irregular, the margins sinuate or emarginate in front of the humeral angles; disk of hind lobe with two longitudinal carinæ; veins of elytral membrane with numerous branches; front femora grooved to receive the curved tibiæ in repose, the margins of the groove and the tibiæ very finely and closely toothed (fig. 3, *c*); abdomen strongly widened and reflexed behind the middle. Seven species occur in our territory.

KEY TO EASTERN SPECIES OF PHYMATA.

- a.* Larger, 8—12 mm.; membrane brown; head usually with two tubercles each side of disk.
- b.* Fourth antennal, especially that of male, longer than second and third united. 478. WOLFFII.
- bb.* Fourth antennal not longer in either sex than second and third united, often much shorter.

c. Side margins of basal half of pronotum with one acute tooth or none; apical angle of fourth connexival obtuse, not, or very slightly, prolonged outward beyond tip of fifth.

d. Notch of side margins of pronotum wide and shallow, much wider than deep; side margins of hind lobe of pronotum subtruncate with a single tooth on its humeral angle; legs not annulate.

479. FASCIATA.

dd. Notch of side margins of pronotum not wider than deep; side margins of hind lobe of pronotum obtusely rounded, without tooth at hind angles; middle and hind legs annulate with darker.

480. NOUALHIERI.

cc. Side margins of basal half of pronotum with two acute teeth; apical angle of fourth connexival acute, distinctly prolonged beyond the tip of fifth.

481. GUERINI.

aa. Smaller, length not over 7.5 mm.; membrane usually whitish-hyaline.

e. Head with two prominent subconical tubercles each side of disk; pronotum not constricted or notched on the sides between the two lobes; membrane brown, paler towards apex.

482. ALBOPICTA.

ee. Head with but one tubercle each side of disk; pronotum feebly notched on sides.

f. Fourth connexival with apex acute, distinctly projecting beyond the fifth; fourth antennal of male nearly one-third longer than second and third united; sides of pronotum without a notch.

483. ACUTANGULA.

ff. Fourth connexival with apex obliquely truncate, not projecting beyond the fifth; fourth antennal of male but slightly longer than second and third united; sides of pronotum with a small notch behind the middle.

484. VICINA.

478 (689b). PHYMATA WOLFFII Stal, 1876, 133.

Elongate-oval, male; broadly oval, female. Color above variable; in male with head, pronotum and scutellum usually in great part or wholly black; in female, dull brownish-yellow; fourth antennal fuscous; elytra, including membrane, usually brown in male, the corium with outer half dull yellow in female; abdomen with a broad black or reddish-brown band crossing the fourth and fifth dorsals; under surface greenish-yellow, the pleura and sides of fourth and fifth ventrals darker; tibiae and tarsi usually green. Head granulated, the disk with two pairs of tubercles. Pronotum with sides reflexed, their margins with an obtuse median notch, the edges of front lobe granulated, of hind one with two very short obtuse teeth, the front one with a short carina extending inward from its base. Scutellum with a granulated longitudinal median carina. Abdomen gradually widened, the fourth and fifth dorsals acute and prolonged, the apex of fourth surpassing that of fifth. Genital plate of male elliptical, convex, its margins fringed with hairs. Other characters as in key. Length, 8—10 mm.

Common throughout southern Indiana; less so in the north-

ern counties, July—October. Occurs mainly on flowers of goldenrod, boneset, ironweed, great ragweed and other Compositæ, mating in August and September. The female of one pair so taken was complacently sucking the juices of a bee which she had just captured. The females are always paler than the males, some of the latter, when fresh, being almost wholly black above. This form, as above described, is usually listed as a variety of the European *P. crosa* L. Stal and Handlirsch thought it distinct, the latter describing it under the name *pensylvanica*, a synonym. As they had examples of the European species before them I place it under Stal's name. Its known range extends from Quebec and New England west to Illinois and south to Florida, the only record from Florida being that of Handlirsch for his *pensylvanica*.

479 (689a). PHYMATA FASCIATA (Gray), 1832, 242.

Form of *wolffii* but larger. General color yellow or greenish-yellow, the hind lobe of pronotum, scutellum except tip, corium except a spot near



Fig. 123, *a*, dorsal view X 2; *b*, side view; *c*, front leg; *d*, beak. (After Riley).

middle, membrane and a band across the widest part of abdomen, pale brown or reddish-brown; pleura and ends of fourth and fifth ventrals tinged with brownish. Head as in *wolffii*; the tubercles more prominent. Fourth joint of antennæ always shorter than in *wolffii*, but little longer than either 2 or 3, which are subequal. Pronotum with notch of

side margins more acute, the hind lobe subtruncate with a single tooth at its hind angle. Abdomen more gradually and more widely expanded, the tips of both fourth and fifth dorsals obtuse and subequal in length. Length, 9—12 mm. (Fig. 123).

Frequent throughout Indiana, May 14—Oct. 23, its habits being the same as those of *wolffii*. Dunedin, Fla., Nov. 27. This is the only definite locality record for that State, though recorded from there by Handlirsch. Ranges from New Jersey and Maryland westward across the continent and southwest to Texas, Arizona and Mexico. The larger size, paler color, more widely and less angulately expanded abdomen and much shorter fourth joint of antennæ distinguish this form from *wolffii*. Both it and *guerini* are usually listed as varieties of the European *croca* L.

480 (688). PHYMATA NOUALHIERI Handlirsch, 1897, 153.

Elongate, oboval, widest much behind the middle. Dull reddish-gray, pronotum sometimes in great part black; the usual dark cross-bar behind middle of elytra vague or wanting; under surface reddish-brown, the sides of abdomen mottled with blackish; antennæ dull yellow; beak and legs reddish brown, the middle and hind femora and tibiæ broadly annulate with blackish. Head one-half longer than wide with a subconical tubercle each side of disk. Fourth antennal about as long as 2 and 3 united, male, distinctly shorter, female. Pronotum with disk uneven, its margins unarmed, but thickened and feebly rounded both in front and behind the median notch. Connexivals 1—3 with apical angles ending in a short blunt tubercle, 4 and 5 higher and wider, their margins bluntly rounded. Membrane brown, with a network of numerous large cells. Length, 8—9 mm.

Marion, N. Car., July 28 (*Brimley*). Described from Pennsylvania, Georgia, Mexico and Guatemala. Recorded from Biscayne Bay, Fla.

481 (689d). PHYMATA GUERINI Lethierry & Severin, 1896, 28.

Form of *P. fasciata*. Color much as there, the brown of upper surface more pronounced, in the males often more nearly black as in *wolffii* the seventh dorsal with a dark bar. Head with the front pair of tubercles very small; fourth joint of antennæ about three-fourths as long as 2 and 3 united, male, distinctly shorter, female. Pronotum with sinus of side margins narrower and deeper, the margins of hind lobe more expanded, more strongly upcurved, each with an acute tooth at hind angle and another near middle. Abdomen with ends of fourth and fifth dorsals strongly expanded, their tips acute, that of fourth surpassing the fifth; hind angle of each connexival distinctly prolonged backward. Length, 8—10 mm.

Common throughout eastern and southern Florida, Nov. 16—April 10. Taken at most of my collecting stations and recorded from numerous others between Jacksonville and Key West. Frequent about Dunedin throughout the winter on flowers of thistle and other plants, and on tall grasses along margins of ponds. Originally described from Cuba as *P. crosa* by Guerin. Known only from the West Indies and Florida.

482 (686). PHYMATA ALBOPICTA Handlirsch, 1897, 151.

Elongate-oval. Head and pronotum pale brown, the latter with two pale spots on reflexed margins of front half; scutellum clay-yellow; elytra dark brown, basal half of corium in part paler; connexivals clay-yellow, the fourth and basal half of fifth black; legs yellow, basal half of femora and tarsi darker. Joint 4 of antennæ dark brown, paler at base, as long as 2 and 3 united, male, much shorter, female. Head with a rather long subvertical bifurcate process. Pronotum with sides strongly reflexed, their margins broadly curved throughout and with a slender

tooth on front angles and two on basal third, the interval between the teeth finely serrate; basal half of disk with two carinæ, these visibly divergent behind. Abdomen abruptly expanded behind the middle, the apex of fourth connexival subacute, much prolonged beyond that of fifth. Length, 6.8—7.4 mm.

Vera Paz, Guatemala (*British Mus. Coll.*). Described from Georgia. Known also from Mexico.

483 (690). *PHYMATA ACUTANGULA* (Guerin), 1857, 408.

Elongate-oval, widest behind middle of abdomen. Dull yellow; head, pronotum in great part, scutellum and a cross-bar behind middle of elytra dark brown or blackish; two spots on sides of front half of pronotum and connexivals in front of and behind the transverse black bar, white, the white connexivals with small black spots; corium a dirty grayish-white; membrane whitish-hyaline; antennæ, tibiæ, tarsi and last three ventrals yellowish-white. Head twice as long as broad, the forks of frontal process more or less divergent. Fourth antennal of male distinctly longer than 2 and 3 united; of female much shorter. Pronotum strongly narrowed from humeral angles to apex, the side margins sinuate with median notch very small or obsolete; hind lobe with sides dilated and reflexed, their margins subtruncate and bearing two or three short obtuse teeth. Abdomen with fourth and fifth connexivals abruptly expanded, the fourth with margin oblique, its apical angle subacute, slightly prolonged backward and distinctly projecting beyond the fifth. Hind margin of last dorsal of male squarely truncate. Length, 5—7 mm. (Fig. 124).



Fig. 124, Female X 6.
(After Champion).

Dunedin, Fla., Dec. 16—April 10. Two specimens taken by sweeping or beating in moist places, a third beneath a board on margin of pond. A tropical American species ranging south to Argentina and known heretofore in this country only from Texas.

484 (685). *PHYMATA VICINA* Handlirsch, 1897, 150.

Elongate-oval, widest behind the middle. Head, pronotum in great part, scutellum, a broad bar across the middle of abdomen and some spots on connexivals blackish; two submarginal spots on front lobe of pronotum, elytra, except membrane, and connexivals in front of and behind the black bar, grayish-white; antennæ, tibiæ, tarsi, fifth and sixth ventrals and genital plate, dull yellow; femora black, the knees pale. Head with forks of frontal process divergent. Pronotum broader, less narrowed in front, the sides more rounded than in *acutangula*, its nearest ally; side margins sinuate with median sinus distinct, but small and teeth of hind lobes much shorter; disk of hind lobe more convex, more coarsely and densely punctate, its median carina more prominent. Abdo-

men less abruptly dilated behind than in *acutangula*; the fourth connexival obliquely subtruncate, its hind angle much less prominent. Hind margin of last dorsal of male obviously but very broadly and shallowly emarginate. Length, 6.5—7.5 mm.

Hessville, Lake Co., Ind., June 30; Lahaway, N. J., Aug. 1 (*Gerhard*). Recorded heretofore only from Sanford, Fla., Massachusetts, Rhode Island and Connecticut.

II. MACROCEPHALUS Swederus, 1787, 183.

Species of medium or small size having the head long, subcylindrical, porrect; antennæ very short and stout, inserted on the front of head between the lateral expansions of the cheeks;

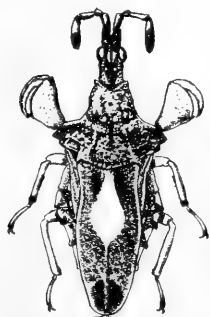


Fig. 125. *Macrocephalus notatus* Westw., a Texas species; male, X 4.
(After Champion).

front lobe of pronotum much narrower and on a lower plane than hind one, its front margin concave, disk granulate, hind lobe with humeral angles obtuse, hind margin sinuate, disk punctate; scutellum elongate-oval, reaching tip of abdomen, its apex rounded (fig. 125); connexivum almost wholly exposed; front coxæ very long, front femora greatly enlarged, concave within and fitted with a groove for the reception of the strongly curved tibiæ. Genital plate of male suborbicular, convex, its hind margin depressed. About 30 species are known, mostly from tropical America, two of which occur in our territory.

KEY TO EASTERN SPECIES OF MACROCEPHALUS.

- a. Scutellum with a smooth yellowish calloused median carina or elevation, widest behind and reaching its middle or beyond; hind lobe of pronotum bicarinate, its humeral angles notched; larger, length 9—11 mm. 485. CIMICOIDES.
- aa. Scutellum with a narrow median carina which is yellowish and calloused only at extreme base; hind lobe of pronotum with only traces of carinæ, its humeral angles obtuse, entire; smaller, not over 5.5 mm. 486. PREHENSILIS.

485 (691). MACROCEPHALUS CIMICOIDES Swederus, 1787, 185.

Elongate-oval, dilated behind. General color dull reddish-yellow, the basal lobe of pronotum and scutellum purplish-brown, fading to grayish-brown, the scutellar callosity yellow; antennæ reddish-brown; tibiæ and tarsi greenish-yellow. Antennæ shorter than head, very stout, basal joint subclavate, its apex hollowed out to receive the base of second, the latter constricted to form a ball-like base; third joint slightly longer than second, subclavate, fourth much stouter, fusiform or subconical, slightly longer than 2 and 3 united. Front lobe of pronotum with

sides rounded, disk granulate; hind lobe much wider, its disk uneven, thickly, rather coarsely punctate, the carinæ divergent behind. Median callosity of scutellum with apical half widened and flattened, its apex subtruncate with angles and middle usually slightly prolonged, the latter continued as a fine carina to apex of scutellum. Connexivum of female more widely expanded and exposed than in male. Length, 9—11 mm.

Dunedin and R. P. Park, Fla., Jan. 20—April 11. Frequent at Dunedin in open pine woods in early spring on the flowers of low shrubs, especially those of a dwarf pawpaw, *Asimina parviflora* Michx., and a low huckleberry, *Laccinia myrsinites* Lam. Nymphs were taken only once, Nov. 23, on the huckleberry mentioned. The adults hibernate on the under side of leaves or dead weeds which afford them protective coloration.

The known range of *M. cimicoides* extends from "Carolina" and Florida west to Texas and California. In Florida it has been recorded from several stations between Jacksonville and Ft. Myers and doubtless occurs sparingly over most of the State. When fresh the basal half of pronotum and the scutellum are often a handsome reddish-purple and the callosity of the latter sometimes blue. This varied hue taken in connection with the peculiar shape and large front legs make this one of the most bizarre forms of our Heteropterous fauna.

486 (695). *MACROCEPHALUS PREHENSILIS* (Fabricius), 1803, 123.

Elongate-oval. Dull yellow or greenish-yellow; upper surface with head, pronotum and a wide median stripe the full length of scutellum, blackish; antennæ brown; tibiæ and tarsi greenish-yellow. Antennæ much as in *cimicoides*, joints 2 and 3 subequal, the third subclavate. Pronotum with disk much less uneven and more flattened than in *cimicoides*, thickly and deeply punctate, the margins of front lobe rather sharp and granulate. Carina of scutellum narrow, of equal width throughout, its pale basal calloused portions very short. Length, 5—5.5 mm.

Dunedin, Fla., April 10—18. Three taken singly by sweeping low vegetation along the margins of ponds. Recorded by Barber from ten other stations in the State. Ranges from "Carolina," Kentucky and Tennessee, south and southwest to Texas and Mexico.

The *Macrocephalus manicatus* (Fabr.) listed from "Carolina" and Texas by Van Duzee (1917, 230) was regarded by Stal as a synonym of *cimicoides*. The locality "Amerique du Nord," cited by Handlirsch (1897, 193) for his *M. gracilis*, is too indefinite for the insect to be included in this work.

Family XVIII. PLOIARIIDÆ Dohrn, 1863, 43.

THE THREAD-LEGGED BUGS.

Heteroptera of very slender elongate form and variable length having the head either porrect or declivent behind, not pedicellate, usually divided into two lobes by a transverse suture between the eyes; ocelli absent; eyes placed on sides of middle of head, usually large and coarsely granulated; antennæ 4-jointed, the first and second joints unusually long; beak short, 3-jointed, attached to tip of head, without downward projecting bristles, the basal joint bent downward; pronotum variable in form and size; scutellum small, triangular; elytra often absent, when present in great part hyaline and of uniform texture throughout; front legs raptorial, their coxal cavities opening forward and downward and with a minutely striated longitudinal groove between them, the coxæ greatly elongated, reaching or surpassing apex of head; front femora armed beneath with numerous spines or setæ; front tibiæ strongly retractile, also usually armed beneath; middle and hind legs filiform, very long and slender.

As treated by McAtee & Malloch (1925) the family is represented on the American continent by about 160 known species, 44 of which are found in the United States. Of these 26 are known from our territory. They occur mostly beneath loose bark, in the bases of tufts of grass, in bunches of dead leaves, or in old barns, dwellings, cellars and outhouses, where they prey upon other insects which happen in their way. Our United States species are distributed among eight genera, seven of which are represented in the eastern states. The principal literature pertaining to them is by Dohrn, 1860, 1863; Stal, 1872, 1874; Champion, 1898; Banks, 1909; Bergroth, 1906a, 1922a, 1922b; McAtee & Malloch, 1925.

KEY TO EASTERN GENERA OF PLOIARIIDÆ.

- a. Front tarsi flexible, distinctly 2- or 3-jointed; front trochanters unarmed; body of adults winged, the elytra surpassing abdomen; front femora spinose from the base; claws of front tarsus two, usually equal.
- b. Elytra with two completely enclosed discal cells, the basal one triangular (fig. 1);⁵⁹ pronotum extending backward over mesonotum to bases of wings, always with a deep constriction, some-

⁵⁹The figures cited in keys and descriptions of the family Ploiariidæ refer, for the most part, to those on plates V and VI, pages 512 and 528.

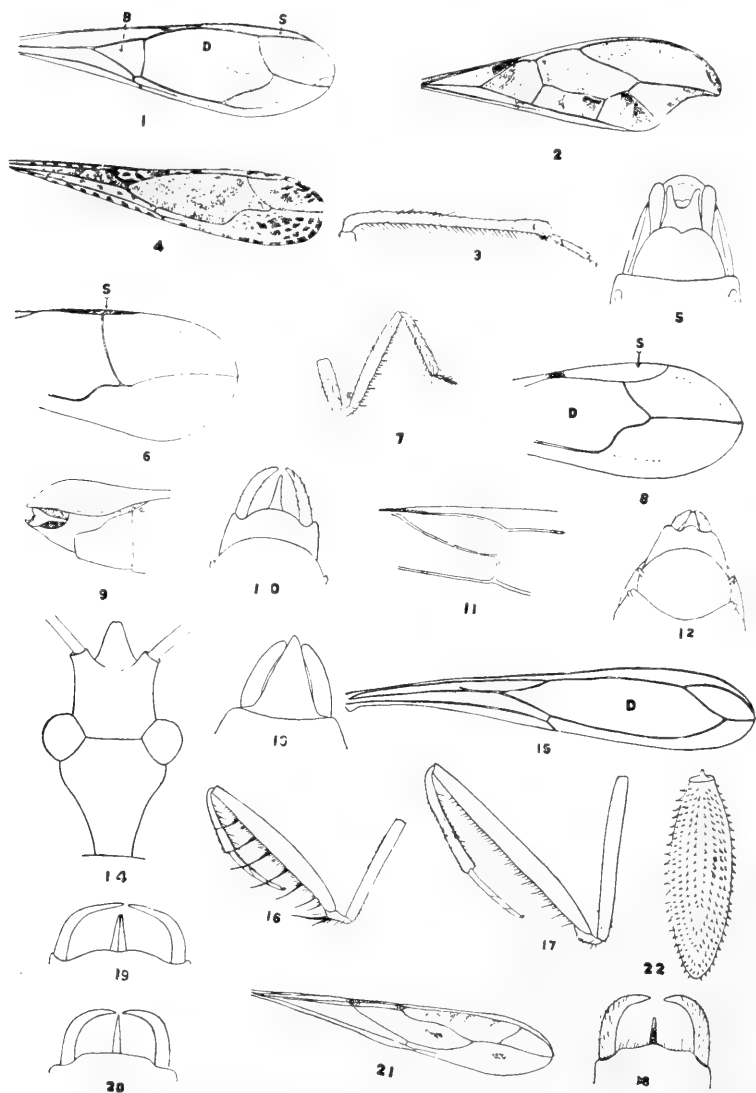


Plate V. STRUCTURES OF STENOLEMUS, EMPICORIS, LUTEVOPSIS and PLOIARIA.

Fig. 1, Elytron of *Stenolemus* showing venation; S=stigma; D=discal cell; B=basal discal cell. Fig. 2, Elytron of *S. hirtipes*. Fig. 3, Front tibia and tarsus of *Empicoris tuberculatus*. Fig. 4, Elytron of same species. Fig. 5, Under side of apex of abdomen of male of *E. rubromaculatus*. Figs. 6 and 8, Apex of fore wings of *E. winnemana* and *E. vagabundus*. Fig. 7, Front leg of *S. longicornis*. Fig. 9, Side view of apex of abdomen of *E. culiciformis*. Figs. 10, 12 and 13, Under side of apex of male abdomens of *E. armatus*, *E. tuberculatus* and *E. reticulatus*. Fig. 11, Cross-veins of hind wing of *E. winnemana*. Figs. 14 and 15, Head and elytron of *Lutevopsis longimanus*. Figs. 16 and 17, Front leg of *Ploiaria*, showing different types of femoral armature. Figs. 18, 19 and 20, Hind margins of genital plates of males of *Ploiaria hirticornis*, *P. carolina* and *P. floridana*. Fig. 21, Elytron of *P. setulifera*. Fig. 22, Egg of *Emesaya brevipennis*. All greatly enlarged.

(After McAtee & Malloch, Proc. U. S. Nat. Mus., Vol. 67, Art. 1).

times pedunculate; antennæ and legs with numerous long erect hairs⁶⁰ (fig. 7); elytra with the inner apical margin concave⁶⁰ (fig. 2).

I. STENOLEMUS, p. 513.

bb. Elytra with but one discal cell (figs. 4, 15); pronotum seldom with a deep constriction, never pedunculate; antennæ and legs without long erect hairs.⁶¹

c. Front tarsi 2-jointed; meso- and metanota usually each with a spine; pronotum slightly constricted near front margin.

II. EMPICORIS, p. 515.

cc. Front tarsi 3-jointed; meso- and metanota unarmed; pronotum slightly constricted near middle; venation of elytra as in fig. 15.

III. LUTEVOPSIS, p. 523.

aa. Front tarsi rigid or inflexible, either 1-jointed or so heavily chitinized that the sutures are invisible; body winged or apterous; claws of front tarsi usually either unequal or single.

d. Front femora spinose from the base (figs. 16 and 17); pronotum not extending over mesonotum.

IV. PLOIARIA,⁶² p. 524.

dd. Front femora spinose from about the basal third or middle (fig. 32); pronotum in winged forms overlapping mesonotum to base of wings.

e. Head without tubercles or spines; elytra, when present, with one discal cell (fig. 28); basal ventral spine of front femur much longer than the others; front tarsi with two equal claws; length, 28 or more mm.

V. EMESAYA, p. 527.

ee. Head normally with tubercles or spines (figs. 23 and 24); elytra, when present, with two discal cells; front tarsi with one claw.

f. Head with two tubercles or spines, one between bases of antennæ, the other just beneath it decurved above base of beak (fig. 23); front tarsus with two rows of decumbent setæ on its lower surface (fig. 33); adults often winged, the elytra shorter than abdomen; length, less than 18 mm.

VI. METAPTERUS, p. 531.

ff. Head with a single slender curved spine between bases of antennæ (fig. 24); front tarsus with two rows of very fine elongate deflected knife-like teeth on its lower surface (fig. 25); adults never winged; length, 20—25 mm.

VII. GHILIANELLA, p. 535.

I. STENOLEMUS, Signoret, 1858, 251.

Species of medium size and, for the family, of rather stout form, having the head short, broader across the eyes than long, its hind lobe armed with two short obtuse spines; eyes very large and prominent; beak stout, its second joint swollen at

⁶⁰In our eastern species.

⁶¹Except in *Empicoris pilosus*.

⁶²McAtee & Malloch place this genus under that primary division of their key having the "fore tarsi distinctly segmented, the dividing sutures always visible under a high power lens," yet in the section leading directly to *Ploiaria* they say "tarsi heavily chitinized, fused so closely that the oblique sutures are visible only under a very high power lens." Since the sutures are invisible with the lenses at hand, I place the genus under *aa*.

base; pronotum with front lobe subquadrate or subglobose, narrower than head across the eyes, either deeply constricted or united to the hind lobe by a slender cylindrical peduncle; hind lobe subcordate, its disk in our species with four tubercles near hind margin, sides declivent, distinctly converging from the base, the latter broadly emarginate; meso- and metanota each armed with a short spine on middle of hind margin; elytra gradually widened from base to apex, the latter with inner margin obliquely concave, the basal discal cell emitting a short branch from the basal third of its costal margin; front coxæ about half the length of femora, the latter but slightly longer than tibiæ. Eleven species are known from North and South America, two from our territory.

KEY TO EASTERN SPECIES OF STENOLEMUS.

- a. Prothorax deeply constricted, not pedunculate; spines of front femora very short, the basal one directed straight downward (fig. 7); meso- and metanotal spines stout, the former strongly inclined backward. 487. *LONGICORNIS*.
- aa. Prothorax strongly pedunculate, the cylindrical peduncle as long as front lobe; spines of front femora longer and more slender, nearly as long as the tibial diameter, the basal one inclined backward; meso- and metanotal spines slender, both suberect. 488. *HIRTIPES*.

487 (—). *STENOLEMUS LONGICORNIS* (Blatchley), 1925, 46.

Elongate, robust for the family. Head and front lobe of pronotum fuscous-brown, the former with one, the latter with three, pale stripes; hind lobe of pronotum dull yellow; meso- and metanota dark brown; elytra pale brown, the margins, main nerves and all the nervures pale yellow; under surface piceous-brown, the genital segments paler; antennæ and legs pale yellow, annulated with pale brown. Hind lobe of head with an obtuse tubercle each side; antennæ with joint 2 slightly longer than 1, 3 one-fourth as long as 2, nearly twice as long as 4. Front lobe of pronotum subquadrate, not tapering in front or behind. Ventrals 3—5 without submedian tubercles. Spines of front femora and tibiæ black, short, relatively stout. Genital plate of male small, scoop-shaped. Length, 8—11 mm.

Cape Sable and Key West, Fla., Feb. 23—March 1. Five specimens were taken by beating in dense hammocks along the margins of tidewater lagoons. The *Stenolemus pristinus* McAtee & Malloch (1925, 29) is a synonym.

488 (—). *STENOLEMUS HIRTIPES* McAtee & Malloch, 1925, 32.

Elongate, slender. Above pale clay-yellow; head and pronotum with a brownish tinge; elytra with several of the larger membranous cells in part or wholly brown (fig. 2); antennæ and legs dull yellow, annulated with pale brown; meso- and metasterna brown; abdomen fuscous-brown,

the last ventral and genital plate of male paler. Head with hind lobe strongly declivent, attached to the thorax by a short, very slender neck. Joint 1 of antennæ reaching base of pronotum; 2 more slender, slightly shorter; 3 only one-fourth the length of 2, half as long as 4. Meso- and metanotal spines slender, subequal, the front one erect, the hind one more tapering and curved slightly forward. Ventrals 3—5 each with a pair of short submedian spines near hind margin. Front femora armed beneath with two stout spines and numerous short setæ, the spines white with black tips. Genital plate of male short, scoop-shaped. Length, 9.5—10 mm.

Dunedin, Fla., Feb. 7; one male beaten from buttonwood, *Conocarpus erecta* L. (H. S. B.). Raleigh, N. Car., June (*Brimley*). The only other recorded specimen from Florida is one taken September 24 by Davis at Miami. Known also from South Carolina and Mississippi. This is the species usually listed and recorded as *S. spinicentris* Sign., originally described from Mexico and recorded from Cuba and Arizona, and it is very possible will prove to be that species. McAtee & Malloch, not having seen Signoret's type of *spinicentris*, do not include it in the U. S. fauna, stating that the figure of Signoret shows the "mesonotal spine as erect and acute and the metanotal swollen at tip and curved so as to extend forward past the mesonotal spine." Uhler's remark regarding *S. spinicentris* (1884, 277) will well apply to the species at hand. Of it he wrote: "This is an extremely curious insect, built in the most intangible manner." The short, wide head, very large eyes, slender neck, lobes of pronotum so formed as to resemble a dumb-bell, and slender antennæ and legs, densely clothed with long fine silky erect hairs, make a combination unique in our Heteropterous fauna.

II. EMPICORIS Wolff, 1811, IV.

Slender-bodied species of medium length, having the head porrect, bilobed by a deep sulcus between the eyes, the front lobe subquadrate, the hind one subglobose; antennæ much longer than body, they, as well as legs, annulate with pale and dark rings; pronotum extending over mesonotum to base of wings, its front lobe shorter than head, subquadrate, with sides rounded, hind lobe oblong, nearly twice as long as front one; meso- and metanota and usually the first dorsal, each with a short spine on middle of hind margin; venation of elytra as in figs. 6 and 8; front femora either with bristly hairs or spinose

from the base, the spines or hairs usually very short and numerous; front tibiæ nearly as long as the femora, front tarsi with two distinct segments (fig. 3). Other characters as in generic key.

The species of *Empicoris* appear to be very scarce in Indiana, but occur quite frequently in Florida. There both they and other Ploiariids seem especially partial to leaves of palmetto. From a pile of leaves of cabbage palmetto in my back yard, which were cut in November, I have taken by beating, before April, examples of *Empicoris rubromaculatus*, *barberi* and *palmensis*, *Emesaya brevipennis*, *Ploiaria scutifera* and *hirticornis*, and *Metapterus fraternus*. Both the generic names *Ploiariodes* White and *Ploiariola* Reut. are, according to McAtee & Malloch (1923, 162), to be replaced by *Empicoris* Wolff. Twelve species are recognized by these authors, ten of which occur in the eastern states, and one additional one is herewith added.

KEY TO EASTERN SPECIES OF EMPICORIS.

- a. Hind lobe of pronotum with lateral carinæ obsolete at middle; apical third of elytral costal margin usually marked with red; eighth ventral of male with a large rounded emargination on hind margin (fig. 5). 489. RUBROMACULATUS.
- aa. Hind lobe of pronotum with pale lateral carinæ complete throughout; apical third of costal margin without a red line; eighth ventral of male prolonged backward at middle of hind margin (figs. 12, 13).
- b. Hind lobe of pronotum with two sharp whitish dorsal carinæ, similar to the lateral ones, extending its full length; dark areas of elytra thickly peppered with minute whitish dots; front end of lateral carinæ of pronotum without a small process or knob. 490. BARBERI.
- bb. Pronotum without sharp dorsal carinæ; dark areas of elytra (except in *errabundus*) without whitish dots; lateral carinæ of hind lobe of pronotum each usually ending in front in a more or less distinct process or knob.
- c. Apical third of inner or hind wings either conspicuously spotted with black, or fuscous with white reticulations.
- d. Hind margin of pronotum with a conspicuous black erect median tubercle; front end of lateral carinæ of hind lobe of pronotum ending in a small outward projecting process; elytra not honey-combed as in *reticulatus*, their venation as in fig. 4. 491. TUBERCULATUS.
- dd. Hind margin of pronotum without a tubercle; front end of lateral carinæ of pronotum without an outward projecting process; elytra microscopically honey-combed with fine black lines. 492. RETICULATUS.

- cc. Hind wings not spotted apically or very faintly so at extreme tip.
- e. The large fuscous spots on elytra marked with small white dots; two of the spines at base of under side of front femora about as long as diameter of femora and quite stout; front coxæ not longer than distance from coxal cavity to upper margin of pronotum; hind lobe of pronotum with a very small pale median tubercle on basal margin and a small process on front end of lateral carinæ. 493. *ERRABUNDUS*.
- ee. Fuscous spots of elytra not marked with clear dots; spines at base of fore femora much shorter than femoral diameter; front coxa longer than distance from coxal cavity to upper margin of pronotum.
- f. Pronotum with an evident tubercle on middle of hind margin.
- g. Pronotum with two distinctly curved pilose white lines which are conspicuous on front lobe; bases of elytra white. 494. *NUDUS*.
- gg. Hind lobe of pronotum with two broad white stripes which do not reach its hind margin nor extend onto front lobe; eighth ventral of male with a slender apical process (fig. 10). 495. *ARMATUS*.
- ff. Pronotum without a tubercle on middle of hind margin.
- h. Front lobe of pronotum with two raised curved white lines in addition to the lateral carinæ; hind lobe of pronotum, costal margin of elytra and front legs with numerous very fine erect hairs in addition to the usual pile; mesonotal spine brown, horizontal. 496. *PALMENSIS*.
- hh. Front lobe of pronotum without curved white elevated lines; hind lobe of pronotum and costal margin of elytra without erect hairs.
- i. Stigma, or apical third of costal margin of elytra, linear, entirely black, forming a conspicuous costal streak centered on the vein closing costal half of discal cell, the latter much longer than that closing the other half (fig. 6); cross veins in middle of hind wing forming a straight line (fig. 11). 497. *WINNEMANA*.
- ii. Stigma widened beyond the vein closing costal half of discal cell, the latter not longer than that closing the other half (fig. 8); cross veins in middle of hind wing forming an angulate line.
- j. Antennæ and legs without long hairs; stigma with two or three blackish spots beyond the cross-vein; male claspers knobbed, the knob concave at tip (fig. 9). 498. *CULICIFORMIS*.
- jj. Antennæ and legs beset with numerous long erect hairs; stigma without dark spots beyond the cross-vein; claspers not knobbed. 499. *PILOSUS*.

489 (699). *EMPICORIS RUBROMACULATUS* (Blackburn), 1889, 349.

Elongate, slender. Head and front lobe of pronotum fuscous-brown, finely pubescent, the latter with a black stripe each side; hind lobe of

pronotum paler brown, its two obtuse ridges whitish; elytra grayish-brown, the costal margin and nervures in part white, the apical third of costal stigma usually in part reddish; beak and antennæ annulate with dark brown and white; front coxæ white, the apical fourth and a narrow ring at middle fuscous; front tibiæ and tarsi fuscous, each with two or three narrow white rings; middle and hind legs white, narrowly annulate with numerous black rings. Basal joint of antennæ of male with numerous erect hairs. Eyes very prominent. Meso- and metanotal spines horizontal, subequal. Length, 5—5.5 mm.

Marion Co., Ind., Sept. 29; beaten from branches of dead willow on banks of White River. Dunedin, Fla., Feb. 19—April 13; numerous specimens beaten from bunches of Spanish moss and piles of dead leaves of cabbage palmetto (*H. S. B.*). Raleigh, N. Car., June (*Brimley*). Described from Hawaii; also as *Ploiariodes californica* by Banks (1909, 46) from California. Recorded from Gainesville, Fla.; also from Mississippi, Virginia, Porto Rico and Brazil. A prettily marked little species, the annulations of antennæ being more equal in width than in our other forms; the red mark on edge of corium sometimes very faint.

490 (—). *EMPICORIS BARBERI* (McAtee & Malloch), in Barber, 1923b, 7.

Elongate, slender. General color piceous-brown; head with a whitish line extending from base of each antenna back to occiput, there abruptly bent and uniting with a diagonal one from below each eye; dorsal and lateral carinæ and hind margin of pronotum white; antennæ and legs with numerous narrow black and white annulations, the sub-apical dark one on femora and basal joint of antennæ broader; ventrals clothed with fine yellowish pubescence, 2 and 4 each with a small round bare spot on each side of hind margin. Joint 1 of antennæ one-third longer than 2; 3 twice the length of 4. Hind margin of pronotum without a median tubercle. Meso- and metanotum without spines. Spinules of front femora and tibiæ numerous, very short and fine. Length, 3—3.5 mm.

Dunedin, Fla., Feb. 25; one specimen beaten from a pile of recently killed leaves of cabbage palmetto. Known heretofore only from the unique type, taken in Porto Rico. Easily distinguished by the peculiar white lines on head, white dorsal pronotal carinæ and hyaline dots of corium.

491 (698). *EMPICORIS TUBERCULATUS*⁶³ (Banks), 1909, 46.

Elongate, slender. Head, front lobe of pronotum and under surface fuscous-brown; hind lobe of pronotum paler brown, its sides and hind margins narrowly edged with pale yellow; elytra pale brown, the cross

⁶³Treated by McAtee & Malloch as *E. errabundus* (Say). See the notes under that species.

nervures of the costal area and reticulations of the disk whitish; first and second antennals each with nine or ten pale rings and a similar number of dark ones; beak annulated with white and brown; front coxæ white with two or three small brown dots; front femora and tibiæ largely brown, thickly pilose, each with three or four narrow pale rings; middle and hind femora and tibiæ white, each with ten or more narrow brown rings; connexivals blackish, each with a whitish spot near the incisures. Joints 1 and 2 of antennæ subequal; 3 one-third the length of 2, three times as long as 4. Front lobe of pronotum with middle concave and an obtuse ridge on each side; hind lobe about as wide as long, its disk with two low obtuse ridges, and hind margin with a short stout black spine between their bases. Spine of mesonotum inclined, subequal in length to the erect one of metanotum. Elytra slightly surpassing abdomen, their tips conjointly broadly rounded, the extreme apex subtruncate (fig. 4); eighth ventral of male with an obtusely pointed apical spine (fig. 12). Length, 4.5—5 mm.

Falls Church, Va., Aug. 7, type (*Banks*). Herndon, Va., August (*McAttee*). Argo and Edgebrook, Ill., Aug. 13—17 (*Gerhard*); one of the two specimens from a branch of dead hickory. Ranges from Ontario and New England southwest to Georgia and Texas and west to Iowa and Kansas. One of our most widely distributed species of *Empicoris*, but the synonymy is so confused that the true range is problematical.

492 (—). *EMPICORIS RETICULATUS* McAttee & Malloch, 1925, 20.

Elongate, slender. Head fuscous-brown, with lines of white pubescence; pronotum yellowish-brown, its hind lobe with two rather broad whitish discal ridges, lateral carinæ and narrow edge of hind margin white; elytra fuscous-brown with white veins or reticulations; apical third of inner wings with numerous distinct fuscous spots; under surface fuscous-black, minutely pubescent; spiracles and a spot on anterior apical angle of each ventral yellowish; middle and hind legs annulate with numerous broad white rings and very narrow dark ones; front femora brown with two narrow pale rings; beak dark brown, its apical joint pale. Fourth antennal nearly half as long as third. Lateral carinæ of pronotum without anterior process or knob, their hind end curved inward and forward at base. Mesonotal spine subhorizontal, pale brown with apex whitish. Front femora armed beneath with two rows of close-set fine setæ. Eighth ventral of male prolonged as in fig. 13. Length, 5—6 mm.

Natchez, Miss., June 2 (*U. S. Nat. Mus.*). Recorded from Massachusetts and Maryland; also from Cordoba, Mexico and Guatemala.

493 (697). *EMPICORIS ERRABUNDUS* (Say), 1832, 34; I, 359.

Elongate, very slender. Head and front lobe of pronotum brown; hind lobe of pronotum and ground color of elytra straw-yellow; basal

half and discal cell of elytra largely pale brown flecked with numerous small white dots; apical third of elytra with several vague fuscous spots; connexivum wholly pale straw-yellow; under surface brown, irregularly marked with fuscous, the narrow side margins of each ventral reddish-yellow. Joint 1 of antennæ brown with 10—12 narrow rings and extreme tip, pale yellow; 2 and 3 dull yellow, the basal half of 2 with three or four vague brownish rings; 4 fuscous-brown; joint 2, three-fourths the length of 1, 3 one-third the length of 2, twice as long as 4. Beak and front coxæ straw-yellow; front femora yellow with two narrow incomplete rings and a broader preapical one, brown; front tibiæ with four dark rings; middle and hind legs pale yellow annulate with numerous dark rings, three of those on femora broader than the others. Pronotum with calli of front lobe convex, prominent, set obliquely and with a minute tubercle in the depression between them; hind lobe nearly two-thirds longer than front one, its median ridges low, obtuse, lateral carinæ ending in a short outward projecting process. Mesonotal spine long, strongly inclined backward, metanotal one, erect, distinctly shorter. Front femora about twice as long and distinctly stouter than front coxæ, the two basal spines distinctly longer and somewhat stouter than the others, the latter irregular in length and thickness. Length, 4—5.5 mm.

Falls Church, Va., Aug. 1—22 (*Banks*). The known range extends from New England west to Pennsylvania and southwest to Virginia. Recorded from a much wider territory, but many of the records under the name of *errabundus* belong to *tuberculatus* (*Banks*), *culiciformis* *De Geer* and *rubromaculatus* (*Blackb.*). *Banks* states that it is usually taken on logs, but that he found it on bark of a live tulip tree; also at light.

The species as described above, is the *Ploiaria parshleyi* of *Bergroth* (1922a, 50, 79), and the *Empicoris parshleyi* (*Bergr.*) of *McAtee & Malloch* (1925, 22). It is not the *E. errabundus* (*Say*) of the latter authors; that being the *E. tuberculatus* *Banks* described above. My reasons for this opinion can be best set forth by a comparison with *Say's* original description, which is as follows:

"This is so closely allied to *Ploiaria vagabunda* *Fabr.*, that I give it a distinct name with much hesitation; nevertheless the anterior thighs are somewhat less elongate, with the two basal spines much more prominent than the others; the abdomen is immaculate, the annulations of the feet are much more obvious; the lateral carinate line of the thorax has a prominence like an obtuse spine before: in these characters it differs from the *vagabunda*; but in the spotted appearance of the hemelytra and the form and magnitude of the scutellar spines it resembles that species."

In the three characters which I have italicised in *Say's* description it agrees with the species treated by *McAtee & Mal-*

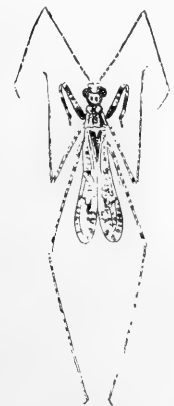
loch as *parshleyi* (Bergr.), whereas in only the last one does it agree with the *tuberculatus* of Banks. Moreover, an astute observer like Say would not have overlooked the prominent tubercle on the basal margin of pronotum if he had had in hand a specimen of *tuberculatus*.

494 (—). *EMPICORIS NUDUS* McAtee & Malloch, 1925, 22.

Elongate, slender. Head dark brown, vertex with two curved lines of fine whitish pile; disk of pronotum chocolate-brown with two white lines which converge from front margin to the constriction and then curve, diverge and end on basal fourth of disk; lateral carinae, Y-shaped mark over humerus on each side and a line along basal margin white; sides of basal half of disk pale brown. Antennae and tibiae annulate as in *armatus*. Median tubercle on basal margin of pronotum, stout, prominent. Front coxae stout, distinctly shorter than pronotum, half as long as femora. Joint 4 of antennae half as long as 3. Length, 4.5 mm.

Known only by a single female in the U. S. National Museum, taken March 6 at Paradise Key, Fla.

495 (—). *EMPICORIS ARMATUS* (Champion), 1898, 165.



Elongate, slender. Head and pronotum fuscous-brown, thickly clothed with short white prostrate hairs, those on head forming three whitish lines, and on hind lobe of pronotum two white stripes as in key; pronotum with lateral carinae, edge of hind margin and a small nodule just within posterior angles ivory-white; elytra fuscous-brown, the veins ivory-white and usually some reddish-brown markings on apical third; under surface dark brown, thickly and minutely pubescent with yellowish hairs, the genital plate of male in part paler; spiracles and a line on each ventral in front of them whitish. Joint 1 of antennae very long, reaching base of middle third of elytra, annulate with 10—12 narrow blackish rings; 2 shorter with 8—11 similar rings; 3 about one-third the length of 2, 4 nearly one-half the length of 3, dusky at base and apex. Pronotum with lateral carinae entire, their front ends without knob or process; tubercle on hind margin stout, suberect, dark brown, its tip white; meso- and metanotal spines white, subhorizontal or strongly inclined. Front femora setose, not spinose beneath. Ventrals impunctate or nearly so. Length, 4—5.5 mm. (Fig. 126).

Fig. 126, X 4.
(After Champion).

Royal Palm Park, Fla., Feb. 28 (*U. S. Nat. Mus.*). Recorded also from Sanford, Sebastian and Gainesville, Fla. Described from Guatemala and Panama. Known also from Porto Rico and Jamaica. The *Placariola mansucta* Berg. (1922a, 51, 80) is a synonym.

496 (—). *EMPICORIS PALMENSIS* sp. nov.

Elongate, slender. Head and front lobe of pronotum dull yellow blotched with fuscous; hind lobe of pronotum a uniform dull yellow; meso- and metanota brownish-yellow, their spines dark brown; elytra dull yellow, the costal margin of each with a small fuscous submarginal blotch in front of middle and another at apical fourth; first and second joints of antennæ each with about nine pale rings alternating with nine narrower brownish ones; beak yellow, the second joint with two fuscous rings, the third with base tinged with fuscous; front legs yellow, the coxæ each with two brownish dots on outer side, the femora with four narrow rings and apical fifth brownish, tibiæ with two brownish rings on basal half and a wider one at apical third; middle and hind legs yellow, alternated with narrow brownish rings; under surface pale brown, the margins yellowish. Joint 2 of antennæ one-fifth shorter than 1, 3 one-half the length of 2, twice as long as 4. Both head and eyes small for the genus. Hind lobe of pronotum subquadrate, the usual obtuse discal ridges scarcely evident. Spine of mesonotum almost horizontal, of metanotum suberect. Elytra surpassing abdomen by one-fifth their length, their tips narrowly rounded. Spines of front femora very short and wholly pale, almost invisible. Length, 4.2—4.7 mm.

Dunedin, Fla., Jan. 20—April 22. Two specimens beaten from the dead leaves of cabbage palmetto. Differs from all our described species in its pale color, erect slender hairs on parts mentioned in key, dark notal spines and relative length of antennals.

497 (—). *EMPICORIS WINNEMANA* McAtee & Malloch, 1925, 19.

Elongate, slender. Head and pronotum dark brown; elytra pale brown, veins whitish, stigma as in key; antennæ and legs fuscous-brown, the usual paler rings, except the incisures, vague or wanting, more distinct on front and middle femora. Antennæ finely pubescent, joint 4 two-fifths as long as 3. Front femora more than twice as long as coxæ, their lower margin thickly beset with short hairs and minute spines. Other characters as in *i* of key. Length, 4.5 mm.

Known only from Plummer's Island, Md., and Vienna, Va., where it occurs in October.

498 (—). *EMPICORIS CULICIFORMIS* (De Geer), 1773, 323.

Elongate, slender. Head and pronotum pale reddish-brown, thickly clothed with very fine silvery-gray hairs; elytra thickly mottled with pale fuscous-brown spots, costal margins pale with two small oblong blackish spots behind the middle; hind wings not spotted near apex; connexivals dark brown, each with a pale spot on front half; beak pale brown, the apex whitish; under surface dark brown, the front half of side margin of each ventral pale; middle and hind legs with dark and pale annulations subequal in width; front coxæ pale with a small spot at middle of each side and apex black; front femora and tibiæ each with

three or four pale rings, the apex of tibiae and tarsi dark brown to black. Pronotum with lateral carinae without anterior process,⁶⁴ its hind lobe with median ridges low and broad. Length, 4—4.5 mm.

Falls Church, Va. (*Banks*). Bucharest (*U. S. Nat. Mus.*); determined by Montandon. A European species known in this country from New England west to Oregon and southwest to Maryland and Virginia. The *Ploiaria maculata* Haldeman (1848, 151) is a synonym.

499 (700). *EMPICORIS PILOSUS* (Fieber), 1861, 149.

Elongate, slender. Pale grayish-yellow. Head with a median line, forked in front, fuscous; front lobe of pronotum with three or four oblong fuscous spots; elytra mottled with large fuscous spots, the veins dull yellow; under surface in great part pale brownish-yellow, the ventrals tinged with fuscous; front femora with three dark brown bands, the apical one the wider; middle and hind femora with four narrow dark rings, and a broad one near apex. Antennae and legs with numerous erect yellowish hairs which are three or four times longer than the thickness of the segments. Length, 6.5—7 mm.

Marne, France (*U. S. Nat. Mus.*). A European species ranging through the northern part of this country, from New England west to Victoria, B. C. Definite records from the interior are scarce, but Hussey (1921, 10) mentions it as taken July 20 from a spider web in Gogebic Co., Mich. *E. pilosus* is usually listed as a variety of *E. vagabundus* (Linn.), also a European species which occurs in western Canada. However, the antennae and legs of that species bear only very short hairs and the general color is more fuscous. A comparison of typical examples of both forms leads to the conclusion that they are very distinct species. The *P. hirtipcs* Banks (1912, 97) is a synonym.

III. LUTEVOPSIS Champion, 1898, 165.

Elongate, slender winged species, having the head about as long as front lobe of pronotum, convex and obliquely narrowed behind, without frontal spine (fig. 14); eyes prominent; beak with basal joint shorter than second; pronotum elongate, the front lobe one-third the longer, cylindrical, widest in front,

⁶⁴In the second paragraph under 2, p. 15, of their key, McAtee & Malloch say: "lateral carinae more or less distinctly produced or capitate at anterior extremities." Under this, according to their key, come the species they treat as *errabundus* and *cuticiformis*, yet in their notes under *cuticiformis*, p. 23, they say: it is distinguished from *errabundus* "by the lateral carina of pronotum lacking the anterior process." They place as a synonym of *cuticiformis* the *errabundus* of Banks (1909, 46), which I regard as the true *errabundus*, yet it has the carinae so produced, thus agreeing with their key but not their statement under *cuticiformis*.

hind one subquadrate, convex, broader, covering the mesothorax; meso- and metanota unarmed; elytra reaching to near apex of abdomen, their venation as in fig. 15; front coxæ about as long as tibiæ, front trochanters unarmed; front femora slightly longer than tibiæ and tarsus united, armed beneath with a series of rather long spines and intervening shorter setæ and hairs, reaching from base to beyond middle; lower face of front tibiæ with a complete series of short denticles; front tarsi with three distinct joints and two equal claws. Two species are known, one occurring in our territory.

500 (—). *LUTEVOPSIS LONGIMANUS* Champion, 1898, 166.

Pale reddish-brown to piceous, shining; elytra fuscous-hyaline, the veins dark; connexival sutures each usually with a small pale spot; ventrals fuscous-brown. Head three-fifths as long as broad, tapering in front, more so behind (fig. 14), the front lobe with a short deep median impression near base. Pronotum as above described, the front lobe scabrous, hind one finely transversely rugose. Front legs slender, coxæ one-sixth shorter than tibiæ, the latter feebly curved. Sixth dorsal of male broad, curved upward, covering the genital segment, its tip narrowly truncate. Other characters as under generic heading. Length, 9—10 mm.

Described from Mexico. Known in this country only by a specimen in the Heidemann collection taken July 24 at Istach-atla, Fla.

IV. *PLOIARIA* Scopoli, 1786, 60.

Small, slender-bodied Ploiariids having the head almost as broad across the eyes as long, suberect, declivent behind; pronotum distinctly longer than wide, not extending over the mesonotum, the latter covering the mesothorax in the winged forms, its sides usually carinate and disk not tuberculate; meso- and metanota unarmed; elytra, when present, reaching to or beyond apex of abdomen, with venation as in fig. 21; front coxæ almost as long or longer than fore tibiæ, the latter less than half the length of femora, which are spinose from the base; front tarsi claw-like and rigid, the joints fused into one which is curved, compressed and sometimes almost as long as the tibiæ; front trochanters armed with setæ or slender spines.

McAtee & Malloch (1925, 48) have combined with *Ploiaria* the genera *Luteva* Dohrn and *Ploiariopsis* Champ., and have recognized 22 species. Of these four occur in the eastern

states. The *P. simplicipes* (Uhl.) listed by Van Duzee (1917, 235) is a species of *Metapterus*.

KEY TO EASTERN SPECIES OF *PLOIARIA*.

- a. Hind lobe of head armed with an acute median backward projecting spine and two tubercles; male with joints 1 and 2 of antennæ furnished with numerous long erect hairs; pro- and mesonota subequal in length. 501. HIRTICORNIS.
- aa. Hind lobe of head unarmed; antennæ without long hairs.
 - b. Outer margin of under surface of front femora with 4 to 7 long spines arising from conical tubercles, these with much shorter ones intervening (fig. 16); general color dark brown; length, 6—7 mm.
 - c. Pro- and mesonota subequal in length, the latter without a wide median yellow stripe; front tarsus fully two-thirds as long as the tibiæ; last ventral of male as in fig. 19. 502. CAROLINA.
 - cc. Mesonotum longer than pronotum and with wide median stripe and lateral carinæ yellowish; front tarsus less than two-thirds as long as the tibiæ; last ventral of male as in fig. 20. 503. FLORIDANA.
 - bb. Front femora armed beneath with numerous slender bristles of unequal length, the larger ones not arising from elevated bases (fig. 17); general color dull yellow; length, 8 or more mm. 504. SETULIFERA.

501 (706). *PLOIARIA HIRTICORNIS* (Banks), 1909, 44.

Elongate, slender. General color dark brown; head pale, mottled with brown; elytra dull yellow, the smaller nervures and a few small spots fuscous-brown; beak and front legs yellow, annulate or dotted with dark brown; tibiæ wholly dark; antennæ and middle and hind legs dull yellow. Head suberect, as wide across eyes as long, its declivity armed with a small tubercle each side just behind the eyes and a larger median spine. Pronotum subcylindrical, slightly narrower at base, its disk minutely granulated; mesonotum with disk feebly convex, sides slightly converging from base to apex. Elytra surpassing abdomen. Front legs with coxæ longer than head; trochanters armed with two long spines and several bristles; femora armed beneath on outer side with five or six long spines arising from conical tubercles, these with much shorter and finer spines intervening. Genital plate of male furnished with a pair of rather stout curved claspers (fig. 18). Length, 5—7 mm.

Dunedin, Fla., Dec. 3—April 23; two taken from beneath a board on the site of an old house; others beaten from dead leaves of cabbage palmetto or sifted from roots of tufts of grass. Southern Pines, N. Car., Nov. 20—Dec. 14 (*Gerhard*); Dec. 20, type (*Banks*). In all the Dunedin specimens the wings are represented by minute pads while those received from *Gerhard* and *Banks* are fully winged. Described from Southern

Pines and recorded only from there, the District of Columbia and Louisiana. This is our only eastern species representing the genus *Ploiariopsis* as founded by Champion (1898, 163) and merged with *Ploiaria* by McAtee & Malloch. The *Ploiaria carolina* of Banks (1909, 44) *nec.* H.-S., was based on the female of *hirticornis*.

502 (708). *PLOIARIA CAROLINA* (Herrich-Schaeffer), 1853, 8.

Elongate, slender. Color above brown; hind portion of head and pronotum with a vague median pale stripe; lateral carinæ of mesonotum pale; elytra with nervures and some small vague blotches fuscous; front coxæ dull yellow, front femora brown with a pale ring at apical third; antennæ and middle and hind legs brown, the tips of femora paler; under surface dull yellow, the side margins and last two ventrals darker. Hind portion of head subglobose, very smooth. Joint 2 of antennæ one-fourth shorter than 1, 3 and 4 subequal, each about one-third the length of 2. Pronotum subcylindrical, slightly narrower in front of base, disk with a fine median impressed line. Mesonotum oblong, its sides feebly converging from the base, disk subconvex, with a median impressed groove. Elytra gradually slightly widening from base to the rounded tips. Front tibia and tarsus united, equal in length to femur. Front trochanters with two rather stout bristles of unequal length. Genital plate of male elongate, convex, the claspers slender, tapering, curved, their tips meeting (fig. 19). Length, 5—6 mm.

Dunedin, Fla., Dec. 14—March 12; two taken by sweeping flowers of Compositæ in open pine woods, a third beneath loose bark of a pine log. Wrightsville, N. Car., April 16 (*Davis*). Recorded also from Georgia and by Barber from Pablo Beach, Fla. Described from "Carolina."

503 (—). *PLOIARIA FLORIDANA* (Bergroth), 1922b, 218.

Brownish-yellow, tinged with fuscous; pro- and mesonota each with a wide median stripe and lateral carinæ, yellowish; membrane grayish, reticulate with fuscous; front and middle femora and tibiæ fuscous, apical third of femora with a pale ring, the knees of hind pair broadly whitish, genital segment of male fuscous. Head and pronotum of equal length. Antennæ glabrous, joint 1 as long as head and pronotum united, 2 one-half as long as 1. Pronotum slightly shorter than mesonotum, without median impressed line. Hind margin of male genital with but one median spine (fig. 20). Length, 6—7.5 mm.

Known only from Florida; a specimen in the Uhler collection from Crescent City.

504 (—). *PLOIARIA SETULIFERA* McAtee & Malloch, 1925, 55.

Elongate, slender. General color dull yellow; pro- and mesonota with sides pale brown; elytra fuscous-hyaline with a few small, widely scat-

tered fuscous blotches (fig. 21); under surface of abdomen in great part fuscous-brown; front legs dull yellow, the tibiæ with one, the femora with two, faint brown rings; antennæ brown, slightly paler at base. Head as in *carolina*, the tylus more prolonged in front. Joint 2 of antennæ three-fourths the length of 3, the latter subequal to 4. Pronotum slightly longer than mesonotum, the latter with lateral carinæ scarcely evident and median impressed groove faint. Elytra slightly surpassing abdomen. Front legs with coxæ three-fourths the length of femora, the latter with numerous bristle-like spines which vary somewhat in length, but not in thickness (fig. 17); trochanters with one or two short bristles; tarsi reaching almost to base of femora. Length, 8—9 mm.

Dunedin and R. P. Park, Fla., Dec. 7—April 6. Four taken at Dunedin by beating dead leaves of cabbage palmetto; a dozen from the Park by beating fallen dead leaves of royal palm and bunches of Spanish moss in the dense hammock on Paradise Key. In its larger size, paler color and numerous slender spines of front femora this form differs from all our known eastern species. Recorded also from Cape Sable, Fla.

V. EMESAYA McAtee & Malloch, 1925, 74.

This name is proposed by the authors mentioned in place of *Emesa* Fabr., since *E. mantis* Fabr., a species with different generic characters, was named by Laporte as the type of *Emesa*. The genus *Emesaya*, as briefly characterized in the generic key, comprises very elongate, slender species having the head porrect, longer than wide, its hind portion strongly narrowed from the eyes backward; eyes relatively small; pronotum one-half longer than mesonotum, subcylindrical, subclavate, its front end with two blunt tubercles; mesonotum oblong, its sides parallel; elytra narrow, reaching middle of abdomen, the venation as in figs. 28 and 29; abdomen linear, its margins reflexed; front legs with coxæ longer than pro- and mesonota united; femora armed beneath about the middle with a long spine, in front of which are four or five other shorter stout ones, with numerous very small ones intervening; front tibiæ only one-third the length of femora, the tarsi reaching the longest spine; middle and hind legs filiform, the hind femora surpassing tip of abdomen; sixth dorsal of male ending in a long apically rounded flap which covers the last ventral (fig. 27). Nine American species are recognized by McAtee & Malloch, five from the United States and two from our territory. Of one of these only the female type is known.

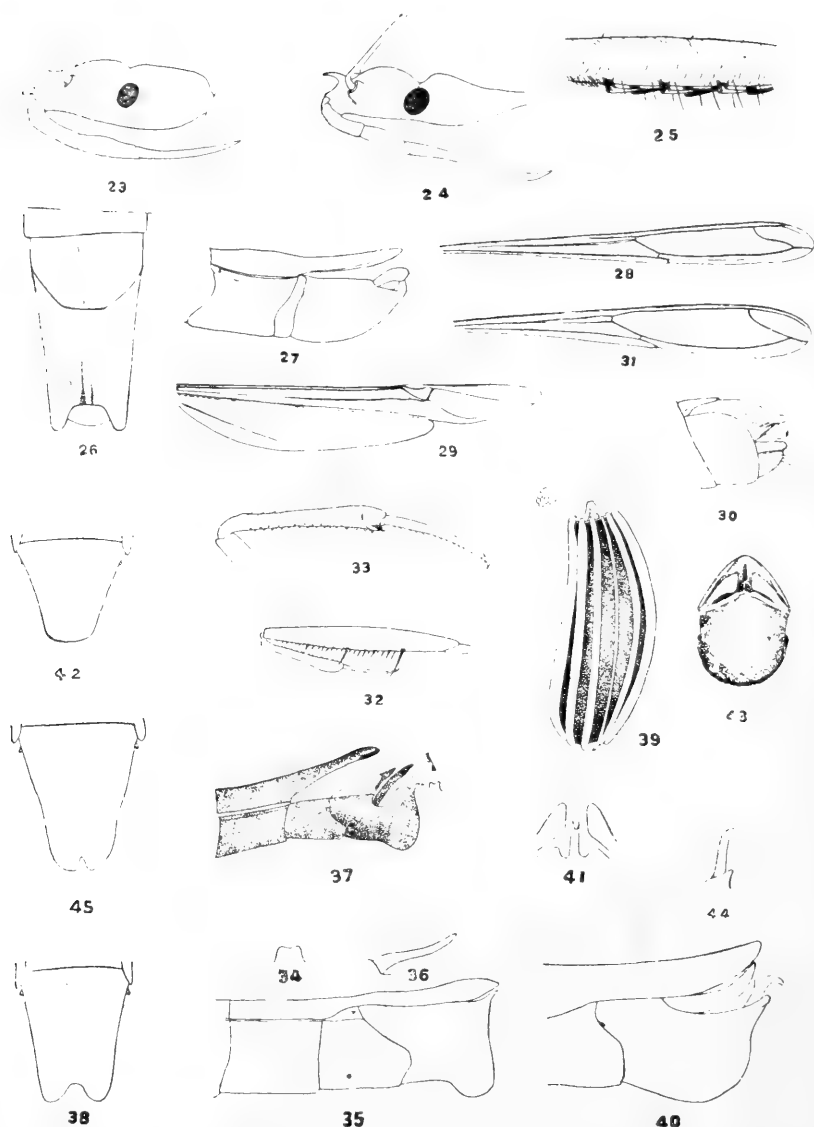


Plate VI. STRUCTURES OF EMESAYA, METAPTERUS AND GHILIANELLA.

Fig. 23, Side view of head and beak of *Metapterus*. Fig. 24, Same as *Ghilianella*. Fig. 25, Section of front tarsus of *Ghilianella* showing armature. Fig. 26, Apex of abdomen of *Emesaya lineata*, from above. Fig. 27, Side view of apex of abdomen of *E. brevipennis*. Figs. 28, 29 and 30, Elytron, inner wing and apex of female abdomen of same species. Fig. 31, Elytron of *Metapterus fraternus*. Fig. 32, Fore leg of *M. uhleri*. Fig. 33, Fore tibia and tarsus of *M. annulipes*. Figs. 34, 35 and 36, Genital hook of male from behind, apex of male abdomen from side and genital clasper of *Metapterus annulipes*. Figs. 37, 38 and 39, Apex of male abdomen from side, last dorsal of female from above and egg of *M. fraternus*. Figs. 40, 41 and 42, Apex of male abdomen from side, genital hook and tips of claspers of male from behind and last dorsal of female from above of *M. uhleri*. Figs. 43, 44 and 45, Genital plate of male from behind, genital hook of male from side and last dorsal of female from above of *M. neglectus*. (After McAtee & Malloch, Proc. U. S. Nat. Mus., Vol. 67, Art. 1).

KEY TO FEMALES OF EASTERN SPECIES OF EMESAYA.⁶⁵

a. Hind margin of eighth tergite between the processes decidedly concave, the emargination broadly U-shaped; seventh and eighth tergites with a median longitudinal bare and slightly elevated line (fig. 26); side of eighth tergite subangulate posteriorly.

505. LINEATA.

aa. Hind margin of eighth tergite between the processes nearly straight, the emargination nearly rectangular; seventh and eighth tergites lacking such a line; side of eighth tergite not at all angulate posteriorly (fig. 30).

506. BREVIPENNIS.

505 (—). EMESAYA LINEATA McAtee & Malloch, 1925, 81.

"*Female*.—Knees of posterior two pairs of legs pale, the middle legs with, the hind legs without, a faint subbasal pale annulus on femur; legs in general pale, head and body dark reddish-brown. Apex of abdomen as in figure 26. Length, 31 mm."

The above is the brief original description of this form. The unique female type, from Crescent City, Fla., is in the U. S. National Museum.

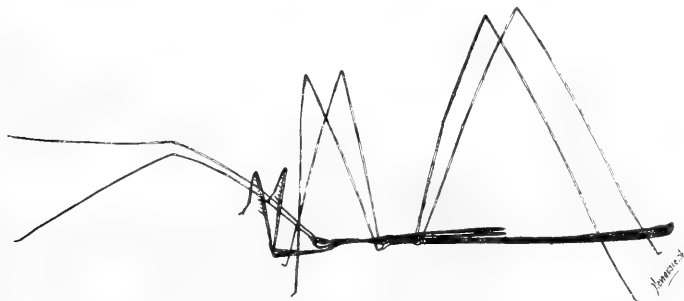


Fig. 127, X 1.5. (After Lugger).

506 (709). EMESAYA BREVIPENNIS (Say), 1828, 105; I, 106.

Elongate, subcylindrical. Dark brown, in fresh specimens thickly clothed with a very fine silvery pubescence; mesonotum and elytra dull brownish-yellow, sometimes dark fuscous-brown with only the margins of the former pale; basal third of abdomen often red; antennæ brown, the tip of basal joint pale; front legs with base of coxæ and knees pale; middle and hind femora brown, with knees and a broad ring at apical third pale; the tibiæ brown with pale ring at basal fourth, sometimes pale with brown ring at same place. Antennæ filiform, joints 1 and 2 subequal, 3 and 4 also subequal, less than one-sixth as long. Beak reaching onto prosternum, its third joint slender, acute, longer than the others united. Length, 33—37 mm. (Fig. 127, and Pl. IV, fig. 1).

Frequent throughout Indiana, July 5—Oct. 25. Dunedin,

⁶⁵From McAtee & Malloch, 1925, 76.

Sarasota and R. P. Park, Fla., Dec. 11—April 18. Recorded from numerous other places in Florida and probably occurs throughout that State. About Dunedin the nymphs are common in winter on or beneath the dead leaves of cabbage palmetto. In Indiana it occurs especially on ceilings and rafters of porches, outhouses, attics, barns and other old buildings. Two were once taken from corners in the leather top of an open surrey. It is usually gregarious where found, and I at one time took it in numbers from *Cratægus* in August. Its known range extends from Canada and New England west to Iowa and southwest to Florida, Texas, Mexico and Central America. It was first described by De Geer (1773, 352) as *Cimex longipes* and most of the records in this country have been under the name *Emesa longipes* (De G.). His name was, however, pre-occupied. This is by far our most common Ploiariid and much has been written of its habits. Say in the notes accompanying his original description says:

"The anterior pair of feet may be compared to those of *Mantis* and *Empusa*. They are much shorter than the others and are used almost altogether for the purpose of seizing and conveying the prey to their mouth, whilst the two posterior pair support the body and move it from place to place. Their movements are rather slow and unsteady, moving up and down upon their legs as they proceed forward in the manner of the crane-fly (*Tipula*). They feed on small insects."

Uhler (1876, 333; 1878, 429, and 1884, 276) says:

"Older specimens are often suffused with red, a kind of ripening toward the autumn, which we have observed to be common in *Euschistus*, *Coreus*, etc. The distinctness of the white bands upon the legs depends upon individual peculiarities, such as maturity and rank feeding. The obese females full of maturing eggs are common late in summer, present a very gross appearance and seem very different from the clearly colored virgin types found earlier in the season. When lodged on the twig of a tree or bush it has a curious habit of swinging back and forth like some of the long legged spiders, such as *Phalangium*. In Maryland its principal home is in the young pine trees where it may be seen with its two fore legs placed close together and stretched out in front as is the habit of our common Phasmid, the *Diapheromera femorata*. Occasionally it leaves the trees and takes shelter in sheds, outhouses and barns, where it may be seen overhead swinging by its long legs from a rafter or the lining of a roof. The nymphs may be found roaming over trees during early summer, but by the middle of August they acquire wings and become fully developed adults."

Banks (1909, 48) says: "There is but one generation a year.

It flies at twilight;" and Smith (1910, 153) mentions it as occurring in New Jersey "on bushes at the edges of fields and about barns and is said to prey on spiders." Wickham (1909; 1910) has given interesting and full accounts of its feeding and mating habits.

McAtee & Malloch (1925, 78) recognize three subspecies of *brevipennis*, two from our territory. Their key separating these is as follows:

KEY TO EASTERN SUBSPECIES OF EMESAYA BREVIPENNIS.

- a. Pale annuli on mid and hind legs tending to obsolescence, especially in males, often the knees only pale. 506a. AUSTRALIS.
- aa. Full complement of pale leg-markings usually evident in both sexes. 506. BREVIPENNIS.

506a (—). EMESAYA BREVIPENNIS AUSTRALIS McAtee & Malloch, 1925, 79.

General color paler than in typical *brevipennis*, the mesonotum, elytra and front femora usually grayish-white; middle and hind legs pale to dark brown with only the knees broadly pale in male; the femora with a vague reddish ring at apical third in female.

Dunedin, Lake Wales, Istokpoga and Utopia, Fla., Feb. 23—April 18. Recorded in our territory from Spring Creek and Bainbridge, Ga., and Gainesville, Fla. Ranges south to Central America and Panama. Of this form its authors (loc. cit.) say:

"From the Gulf States southward to Panama occurs what seems to be a geographical race characterized by a strong tendency, which is almost universal among the males, to lack all pale leg markings except at knees. We have not been able to correlate this character with any structural differences, whether of genitalia or otherwise, although it is noticeable that in this form the processes of the eighth tergite often are shorter than in northern specimens."

VI. METAPTERUS Costa, 1860, 10.

Slender bodied species of medium size having the head longer than wide, suberect, declivent behind; eyes small; beak as in fig. 23; pronotum subcylindrical, longer than the mesonotum, the latter, in winged form, with sides sinuate and disk more or less carinate; scutellum very small, unarmed; elytra of adults often absent, when present narrow, their sides parallel, tips narrowly rounded, reaching apical fourth of abdomen; front legs with coxæ usually shorter than head and pronotum united; femora with first spine long and stout, in our eastern

species usually placed about the basal third, this followed in front by numerous shorter ones, very irregular in length (fig. 32); tibiæ and tarsi subequal in length, united about half the length of femora (fig. 33); middle and hind legs filiform, their femora not or but slightly passing tip of abdomen. Male with last dorsal projected backward in the form of an elongate-oval shield to cover wholly or in great part the genital segment (figs. 35 and 40).

The members of this genus are hygrophilous or semi-aquatic, occurring mostly beneath cover in low moist places, or occasionally even on the surface of water. Our species have heretofore been recorded under the genus *Barce* Stal (1865, 162). McAtee & Malloch have replaced this name with *Metapterus*, the genus *Barce* not being represented in America. Only seven American species of *Metapterus* are known, five from our territory.

KEY TO EASTERN SPECIES OF METAPTERUS.

- a. Front femora distinctly stouter than front coxæ and either annulate or spotted with dark and pale; under surface of head with a yellowish stripe; color not a nearly uniform opaque black.
- b. Under surface of head with a pale yellowish stripe which is not narrower than interocular space and not interrupted by a dark spot on each side behind eye; upper margin of genital plate of male with a subquadrate, slightly emarginate backward curved process (fig. 34) and without an erect spine within the upper border.
- c. Middle and hind femora each annulated with several brown rings; median carina of mesonotum vaguely defined; seventh dorsal of male abdomen with apex obtusely rounded, not projecting beyond the apex of genital (fig. 35). 507. ANNULIPES.
- cc. Middle and hind femora each with but a single preapical dark ring; median carina of mesonotum distinct; seventh dorsal of male with apex more acutely rounded, projecting more or less beyond the apex of genital (fig. 37). 508. FRATERNUS.
- bb. Under surface of head with a pale yellowish stripe which is narrower than interocular space, or is interrupted by a distinct dark spot each side behind eye; upper margin of genital plate of male not produced backward at apex, and with a long spine within its upper border (figs. 41 and 43).
- d. General color dark fuscous-brown; surface rugulæ of abdomen, both above and below, reticulated; apical spine of genital plate of male distinctly curved backward at tip (fig. 40). 509. UHLERI.
- dd. General color straw-yellow; surface rugulæ of abdomen chiefly longitudinal, not reticulated; apical spine of genital plate straight or almost so (fig. 44). 510. NEGLECTUS.

aa. Front femora but little if any stouter than apical half of front coxæ, not annulated or spotted with paler; under surface of head fuscous-brown; color a nearly uniform opaque black.

511. UMBROSUS.

507 (713). *METAPTERUS ANNULIPES* (Stal), 1866, 168.

Elongate, slender, subcylindrical. Dull brownish-yellow to reddish-brown; head with a very narrow median and two lateral stripes yellow; pronotum with a similar median stripe, this often slightly widened in front of middle, and sometimes including a reddish median line; front femora maculate beneath with brown and yellow; tibiæ brown with basal and median pale rings. Elytra usually or always (?) wanting. Last dorsal of female with median notch narrower than in *fraternus*. Length, 11—14 mm.

Marion, Putnam and Vigo counties, Ind., Aug. 31—Dec. 23. Dunedin, R. P. Park and Kissimmee, Fla., Jan. 1—April 1 (*W. S. B.*). Vienna, Va., Aug. 9 (*Barber*). In Indiana it occurs mainly beneath loose bark and on foliage of shrubs and hibernates beneath logs and old rails, especially along borders of low cultivated fields. One pair was taken in coitu as late as Nov. 20. About Dunedin it has been taken sparingly beneath boards and by sifting along the borders of ponds. Not before recorded from that State. Ranges from Quebec and New England west to Wisconsin and Winnipeg, Manitoba, and southwest to Florida and Louisiana, but nowhere common. All specimens at hand are wingless.

508 (715). *METAPTERUS FRATERNUS* (Say), 1832, 33; I, 358.

Form of *annulipes*. Above dull clay-yellow; carinæ of mesonotum and veins of elytra pale yellow; head with two narrow brown stripes; under surface fuscous-brown, the middle of abdomen paler; disk of elytra with numerous small fuscous spots; connexivals and side margins of ventrals each with a small pale spot; tips of beak and of longest spine of front femora brown. Antennæ filiform, joint 2 three-fourths the length of 1, 3 much the shortest, about one-fourth the length of 4, the latter one-half as long as 2. Mesonotum in winged form oblong; three-fourths the length of pronotum, the disk with traces of five carinæ, the median one the most distinct, the intervals between them closely and deeply reticulate-punctate. Female with median notch of last dorsal broader and more shallow than in *annulipes* (fig. 38). Length, 13—15 mm.

Dunedin and Sarasota, Fla., Dec. 15—March 20 (*W. S. B.*). Southern Pines, N. Car. (*Davis*). Occurs beneath cover both in cultivated grounds and along the margins of ponds, hibernating in bunches of Spanish moss. Recorded elsewhere in Florida only from Daytona and Lake Worth. Six of the ten specimens

at hand are winged. The known range of *fraternus* extends from New England west to Kansas and Oklahoma and southwest to Florida, Louisiana and Texas. It has not been taken, but should occur in southern Indiana. The hind tibiæ have three pale rings on basal half, instead of one as stated by Banks in his key (1909, 47). He mentions it as occurring "commonly at Falls Church, Va., at the base of tufts of grass in moist fields in October and November."

As pointed out by Banks (loc. cit.) the *Ploiaria simplicipes* Say Ms., described by Uhler (1878, 430) is probably a nymph of this species. The description of Uhler agrees in all particulars, both in color and structure, with a small wingless *M. fraternus* and not at all with the genus *Ploiaria* under which it is catalogued by Van Duzee.

509 (714). METAPTERUS UHLERI (Banks), 1909, 47.

Elongate, slender. Dark sooty brown or fuscous-black; head, antennæ and legs paler; connexivals of female usually with a small yellow spot on each incisure; membrane of elytra, when present, dull gray and with numerous fuscous granules; upper surface of front femora and tibiæ with a few small paler spots. Pronotum one-third longer than mesonotum, slightly widened in front. Mesonotum with five very fine carinæ, each slightly projected backward from the disk as a cusp. Metanotum with two similar cusps or short prostrate spines. Apex of last dorsal of female entire (fig. 42). Length, 7—10 mm.

Pine, Lake Co., Ind., May 7; Southern Pines, N. Car., Nov. 20—Dec. 14 (*Gerhard*). Cold Springs, N. J., and Wrightsville, N. Car., April (*Davis*). Its known range extends from Massachusetts west to South Dakota and Oxbow, Saskatchewan, and south to Virginia and North Carolina. Its habits are unrecorded except that it was taken in New York under stones. Six of the seven specimens at hand are wingless; in the other one the elytra extend only to base of fifth dorsal.

510 (—). METAPTERUS NEGLECTUS McAtee & Malloch, 1925, 87.

Elongate, slender, subcylindrical. General color dull straw-yellow, head with a vague pale line each side; front femora with four brown spots each side, the basal one elongate; front tibiæ with two brown rings; middle and hind femora with apical halves pale reddish-brown, the former with apex, the latter with two rings and apex pale yellow; middle and hind tibiæ each with three brown rings on basal third; dorsum of abdomen with a narrow reddish line in the groove each side of median ridge, the apical third of each connexival narrowly fuscous-brown. Front legs rather short and stout, their coxæ slightly shorter than head and pronotum united; front femora distinctly stouter and one-fourth

longer than coxæ. Apex of last dorsal of female with a short acute median notch (fig. 45). Length, 11—12 mm.

Lakehurst, N. J., May 13, type (*Davis*); taken from beneath a pile of bricks. Known from Massachusetts, New York and New Jersey.

511 (—). *METAPTERUS UMBROSUS* sp. nov.

Elongate, slender, subcylindrical. Black, opaque; head, both above and below dark reddish-brown, heavily tinged with fuscous; antennæ dark brown; beak and front tibiæ dark brownish-yellow, front tarsi and spines of femora paler; all legs dark fuscous-brown without annuli or pale spots. Front legs relatively very long and slender, their coxæ slightly longer than head and pronotum united, distinctly thickened from base to apex; front femora one-third longer than coxæ and but little if any stouter than apical half of latter, their basal spine at basal two-fifths of under surface, or distinctly farther forward than in our other eastern species; front tarsi about two-thirds the length of tibiæ, the latter only one-third the length of femora. Seventh dorsal of male with apex obtusely rounded, projecting beyond the apex of genital, the latter with an erect spine between the tips of claspers. Length, 15 mm.

Royal Palm Park, Fla., Dec. 7; one apterous male beaten from fallen dead leaves of royal palm in the dense hammock on Paradise Key.

VII. GHILIANELLA Spinola, 1852, 142.

Very elongate, slender wingless species having the head long, cylindrical, porrect, its posterior portion the longer, narrowed behind, its front one with a slender, more or less decurved spine arising from the tip of tylus between the bases of antennæ (fig. 24); eyes small; pronotum slightly longer than either meso- or metanotum, these subequal and tricarinate, the front half of mesonotum more or less narrowed and prolonged forward; abdomen linear, keeled below, usually wider in the female, in males sometimes abruptly inflated at or slightly before apex; middle and hind legs very slender, longer than body; front legs with coxæ longer than pronotum, femora armed beneath with one long spine near middle, followed toward apex by numerous unequal shorter ones. About 40 species have been described, mostly from tropical America. Of these one occurs in Florida.

512 (711). *GHILIANELLA PRODUCTILIS* Barber, 1914, 502.

Linear. Grayish-brown, darker posteriorly and below, thickly clothed with short and fine yellowish pubescence; legs and carinæ of meso- and metanotum straw-yellow; apical half of front coxæ, under sur-

face of front femora, tarsi and a stripe on sides extending from beak to base of pronotum, fuscous; middle of hind lobe of head and middle of pronotum each with a pair of small black dots; ventrals 3—6 each also with a pair of black dots. Head and pronotum thickly minutely granulate. Antennæ very slender, joint 1 yellow, vaguely annulate with reddish-brown, reaching middle of metanotum; 2 pale yellow, more slender and one-fifth shorter than 1; 3 and 4 dusky, much shorter. Hind margin of metanotum broadly and deeply U-shaped to receive the base of abdomen. Front femora about as long as pro- and mesonotum united, their spines pale, black tipped; front tibiæ and tarsi subequal in length, each armed beneath with two rows of short denticles, the tibiæ also with numerous fine setæ. Male with last dorsal ending in an acute up-curved process or flap which covers the genital plate beneath, the latter somewhat compressed and subcarinate. Length, 23—25 mm.

Marco, Fla., April 19, male type (*Davis*). Cape Sable, Fla., April 5, one female from base of dense tufts of grass growing on the beach (*H. S. B.*). Known elsewhere only from Big Pine Key, Fla., and Vict. de las Tunas, Cuba.

Family XIX. REDUVIIDÆ Latreille, 1807, 126.

THE ASSASSIN BUGS

Heteroptera varying much in size, form and general facies, but all stouter bodied than the Ploiariidæ and having the head bilobed by a transverse groove between the eyes; ocelli present

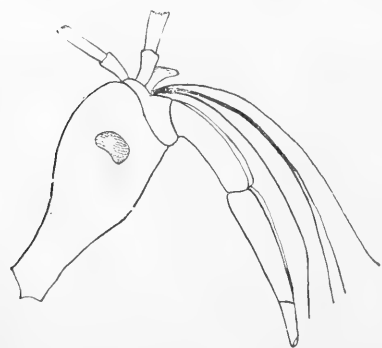


Fig. 128. Side view of beak of *Reduvius personatus* (L.), the setæ removed from the sheath. (After Lugger).

(except in the first two sub-families); beak stout, rigid, 3-jointed (fig. 128), usually curved in the form of a semi-loop beneath the head, its tip resting in the stridulatory groove of prosternum; antennæ slender, usually 4-jointed; pronotum with a more or less distinct transverse impression, the front portion narrower than the hind one; scutellum small, triangular; elytra usually entire and covering the abdomen;

membrane with several anastomosing main veins and usually numerous much smaller ones; front legs more or less raptorial, their tibiæ shorter than head, their femora not much stouter than those of middle and hind legs, both femora and tibiæ often thickly clothed on the under-side with stiff bristles, rarely

armed with spines; tarsi 3-jointed (1-jointed in Carthasiinæ), their claws terminal; osteola obscure or wanting.

The family is one of the largest and most important of the Heteroptera, more than 2,000 species being known, most of them tropical in distribution, fewer than 100 occurring in the United States. For the most part our species are beneficial, the majority of them living on the foliage of herbs and shrubs, where they lie concealed and wait for their prey, in the form of small plant-feeding insects, to come within striking distance. A few of the larger forms, when picked up incautiously, often insert their beak quickly and deeply into a finger, causing a deep puncture accompanied by a sharp stinging sensation not unlike that produced by a hornet. This results in numbness and soreness which sometimes lasts for several days. The North American species are distributed among nine subfamilies, all of which are represented in our territory. The principal literature pertaining to them is by Stål, 1872, 1874; Uhler, 1884; Champion, 1898; Caudell, 1901; Fracker, 1913; Neiva, 1914; Del Ponte, 1920; Bueno, 1923.

KEY TO NORTH AMERICAN SUBFAMILIES OF REDUVIIDÆ.⁶⁶

- a. Ocelli absent; elytra always present and entire; length less than 9 mm.
 - b. Antecular part of head subcylindrical, twice as long as interocular width; tarsi 1-jointed. Subfamily I. CARTHASINÆ, p. 538.
 - bb. Antecular part of head obtusely triangular, not longer than interocular width; tarsi 3-jointed. Subfamily II. SAICINÆ, p. 539.
- aa. Ocelli present; elytra sometimes very short; length, 10 or more mm.
 - c. Elytra without a quadrangular or discoidal cell at outer basal angle of the membrane; front, and usually the middle, tibiæ ending in an oval or oblong lobe or plate which is concave and more or less spongy beneath.
 - d. Ocelli placed behind an imaginary transverse line connecting the hind margin of the eyes; second joint of antennæ simple.
 - e. Apex of scutellum narrow, without spines, or prolonged backward as a single spine; antennæ 4-jointed.
 - f. Thorax constricted at or in front of middle; front coxæ terete, their outer side convex. Subfamily IV. REDUVIINÆ, p. 552.
 - ff. Thorax constricted behind the middle; front coxæ with outer side flat or concave. Subfamily V. PIRATINÆ, p. 556.
 - ee. Apex of scutellum broad, emarginate, armed with two spines; antennæ apparently 8-jointed.

Subfamily VI. ECTRICHODIINÆ, p. 561.

⁶⁶The sequence of the subfamilies in this key is not the same as followed in the text, the Stenopodinae there being placed next to the Saicinae, to which they are most closely allied.

- dd. Ocelli placed in front of a transverse line connecting the hind margins of the eyes; second joint of antennæ composed of many small segments united. Subfamily VII. HAMMACERINÆ, p. 562.
- cc. Elytra with a quadrangular or discoidal cell at the base of the membrane; front and middle tibiæ without a terminal plate.
- g. Ocelli farther apart than are the eyes; apical halves of front and middle tibiæ swollen and grooved to receive the retractile tarsi; form oval, robust, the sides of abdomen curved.

Subfamily VIII. APIOMERINÆ, p. 564.

- gg. Ocelli not as far apart as are the eyes; apical halves of front and middle tibiæ not swollen or grooved; form slender, ovoidal or oblong, the sides usually subparallel.

- h. Front lobe of head longer than hind one; anal area of membrane not extending as far forward as does the costal cell; basal joint of antennæ thickened, and in repose porrect, the other joints usually very slender, folding back beneath it and the head.

Subfamily III. STENOPODINÆ, p. 542.

- hh. Front lobe of head (except in *Rhynocoris*) not longer than hind one; anal area of membrane extending farther forward than does the costal cell; basal joint of antennæ slender, rarely if ever porrect.

Subfamily IX. ZELINÆ, p. 566.

Subfamily I. CARTHASINÆ subfam. nov.

Small slender spindle-shaped species having the front lobe of head subcylindrical, much prolonged in front of eyes, hind lobe oblong, its sides subparallel; ocelli wanting; pronotum unarmed, its front lobe subcylindrical, much longer than wide; front coxæ nearly one-half the length of femora; tibiæ all ending in a short lobe at apex which is spongy beneath; tarsi 1-jointed, the claws simple, divergent.

This subfamily is founded to receive the genus *Carthasis* Champ. (1900, 305) and its synonym, *Orthomctrops* Uhl. (1901, 508). Champion placed his genus in the family Nabidæ, from which it differs widely in its form of body, lack of ocelli, presence of a transverse groove between the eyes, short stout curved beak, form of pronotum, long front coxæ and 1-jointed tarsi. Its beak, which is 3-jointed, not 4-jointed as stated by Champion, the form of body and the interocular groove are Reduviid-like in character, while the lack of ocelli, long front coxæ and 1-jointed tarsi ally it with the Ploiariidæ. It is, in my opinion, a sort of connecting link between these two families and Uhler was much nearer right when he placed his *Orthomctrops* in the Saicida (subfamily Saicinæ of the Reduviidæ) than was Champion in referring his genus to the Nabidæ. In this placement Uhler was followed by Fracker (1913, 225).

From the Saicinæ it differs in characters of subfamily importance, as shown in the key and above. The subfamily is represented by one genus containing five described species, four occurring in tropical America and the West Indies, the other in our territory.

I. *CARTHASIS* Champion, 1900, 305.

In addition to the characters above given the members of this genus have the eyes rounded, prominent, coarsely granulated; beak 3-jointed, its base inserted between the tips of the prolonged cheeks, joint 1 as long as 2 and 3 united; antennæ 4-jointed, inserted on the tips of the short cylindrical antenniferous tubercles, joints 1 and 2 stouter than the others, subequal in length, 3 slightly shorter than 2, 4 one-half or more longer than 3; pronotum strongly constricted behind the middle, front lobe subcylindrical, its apex somewhat flaring, hind lobe wider than long, its base truncate; scutellum triangular, its tip acute; elytra constricted opposite apex of scutellum then widened and slightly surpassing abdomen, their tips broadly rounded; front legs raptorial, the femora feebly swollen, armed beneath with a single row of numerous short spines and three or four longer setæ.

513 (835). *CARTHASIS DECORATUS* (Uhler), 1901, 509.

Elongate, slender, strongly constricted at middle. Pale yellow or greenish-yellow; head, base of hind lobe of pronotum, scutellum, clavus, a transverse bar across middle of elytra and the apex of corium, roseate or crimson-red; elytra with a faint fuscous cross-bar behind the scutellum; membrane hyaline, dusky near base; antennæ yellow, the terminal joints fuscous; legs and under surface pale yellow. Disk of pronotum very finely rugose, the humeral angles feebly nodulose above. Corium long and narrow, reaching beyond middle of membrane. Connexivum of female narrowly exposed behind the middle. Under side of head and basal joint of beak beset with several long slender setæ. Front tibiae one-third shorter than femora, armed beneath with numerous very slender spines. Length, 4.5—5 mm.

Dunedin and R. P. Park, Fla., Jan. 3—April 7. Occurs only on shrubs and low undergrowth in dense hammocks. Recorded heretofore from Maryland, New York, New Jersey, Pennsylvania and Mississippi.

Subfamily II. *SAICINÆ* Amyot & Serville, 1843, 371.

Small, elongate slender species having the front portion of head very short, hind portion subglobose and swollen; antennæ

slender, pubescent, the second joint shorter than first; pronotum with front lobe longer than hind one and with a deep median groove; elytra without a discoidal cell in front of basal angle of membrane; front coxæ usually more or less elongate; all the femora more or less setose. Two genera are represented in the eastern states.

KEY TO EASTERN GENERA OF SAICINÆ.

- a.* Pronotum unarmed; apex of scutellum ending in a long horizontal spine; basal joint of tarsi shorter than third, not longer than second. I. *ONCEROTRACHELUS*.
aa. Hind lobe of pronotum armed with two long, acute, suberect, outward-projecting spines; scutellum with two inclined or suberect spines; basal joint of all tarsi longest. II. *SAICA*.

I. *ONCEROTRACHELUS* Stal, 1868, 130.

Rather short slender species having the head porrect; eyes large, coarsely granulated; first joint of beak stout, extending behind the eyes, longer than the others united, setose beneath; pronotum as long as its greatest width, its front lobe with a subglobose convexity each side of the median impressed line; front coxæ three or four times as long as thick; front femora and tibiæ straight, unarmed; middle and hind legs relatively short. Two species are known, one from Grenada, the other from our territory.

514 (717). *ONCEROTRACHELUS ACUMINATUS* (Say), 1832, 32; I, 356.

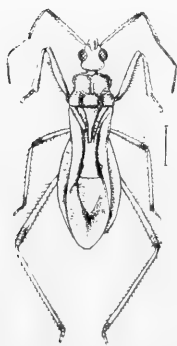


Fig. 129. Female
 X 6.
 (After Champion).

Elongate-oblong, widest behind the middle of abdomen. Dull reddish-brown, the elytra in great part, scutellum and middle of hind lobe of pronotum fuscous-brown; antennæ tinged with fuscous, the basal joint paler; sides of under surface fuscous-brown. Body above, antennæ and legs thickly clothed with fine erect hairs, the joints of antennæ gradually decreasing in length and thickness from the base. Pronotum smooth, its hind lobe with humeral angles convex, the impressed line of front lobe terminating in a fovea on middle of hind one. Scutellum tricarinate, the carinæ merging to form the long terminal spine. Elytra gradually widening behind the middle, their tips broadly rounded, reaching or slightly surpassing tip of abdomen. Length, 5.5—6.5 mm. (Fig. 129).

Frequent throughout Indiana, more so in the southern counties, occurring throughout the year. Sanford, Bassenger, R. P. Park and Dunedin, Fla., November—April. Borden Springs,

Ala., August (*W. S. B.*). Blantyre, N. Car. (*Brimley*). It is often attracted to light, but occurs mainly beneath cover in moist places; in Indiana hibernating in colonies beneath logs and other cover, as many as 50 having been so found at one time. In Florida it has been sifted from tufts of grass in sandy roads and from weed debris along the margins of ponds. It has been recorded only from Charlotte Harbor, Ormond and St. Augustine, but doubtless occurs throughout that State. Its known range extends from New England west to Minnesota and south and southwest to Florida and Texas. Uhler (1884, 279) says that: "Numerous individuals may sometimes be found among rubbish and weeds in low grounds or on the edges of stubble, during late summer and autumn. When pursued they often set the basal joint of the antennæ back and erect the following one as if in the act of listening."

II. SAICA Amyot & Serville, 1843, 371.

Elongate narrow species, having the eyes large, moderately coarsely granulated; first joint of beak scarcely reaching the eyes, second longer than 1 and 3 united; scutellum divided, the front portion short, obtuse, rounded behind, the posterior portion longer, acute, each armed with a spine; front femora and tibiæ strongly curved, unarmed, both they and the femora with numerous close-set rather long setose hairs on the lower or inner sides; these sometimes adhering to resemble spines and often exuding a viscid substance to aid in the capture of small insects. Seven species are known from tropical America and two from Florida. Of these one is so far known only from five nymphs in the fourth instar and is not therefore treated in this work.

515 (718). SAICA FUSCO-VITTATA Barber, 1914, 504.

Elongate, slender, subparallel. Dull straw-yellow; upper surface with a vague, median, ill-defined, dusky stripe extending from vertex to tips of elytra; sides of body with similar but narrower stripes, reaching from eyes back to tip of abdomen; corium with some of the larger nervures tinged with crimson; legs dull yellow, the femora with a sub-apical, the tibiæ with a sub-basal, brownish ring. Joint 1 of antennæ slightly longer than head and pronotum united, stouter than the others, 2 slightly less than one-third the length of 1, 4 about one-half the length of 3, all finely pubescent. Pronotum glabrous, shining; front lobe narrower and slightly longer than hind one, its disk with a wide median groove; hind lobe declivent and armed each side in front of humeral angle with a slender acute spine which is nearly as long as the head.

Scutellum with front spine slightly curved, suberect, nearly as long as those of pronotum, hind one much shorter, slightly upcurved. Elytra reaching tip of abdomen, gradually but feebly widened from base to the broadly rounded apex; nervures of corium elevated, prominent, forming only two completely closed discal cells. Front legs shorter and stouter than the others, their femora armed beneath with numerous short, rather stout setæ; tibiæ of male curved, swollen at apex and beset beneath and within with similar setæ. Length, 8.5 mm.

Dunedin, Fla., April 22, two nymphs in the fourth instar, beaten from the dead leaves of cabbage palmetto. Everglade, Fla., April (*Davis*). Known only from the two localities mentioned.

Subfamily III. STENOPODINÆ Amyot & Serville, 1843, 386.

Slender bodied subparallel species having both head and basal joint of antennæ porrect, the former with front lobe but little narrower than hind one; ocelli placed close together near front or middle of hind lobe; pronotum longer than wide, its transverse constriction scarcely evident; scutellum small, its apex usually ending in a short obtuse horizontal spine; elytra entire, the discoidal cell in front of membrane large, variable in form; connexivum narrowly or not at all exposed; front and middle legs short, the former feebly raptorial, their tibiæ without a terminal spongy fossa; hind legs longer, more slender; ventrals 2—4 placed diagonally, their sutures angulate or curved. About a dozen genera are known, seven of which are represented in our territory.

KEY TO EASTERN GENERA OF STENOPODINÆ.

- a. Head with one or more branched or bifid spines or processes on each side below and behind the eyes.
 - b. Joint 1 of antennæ with apex produced forward as a blunt spine beyond the base of joint 2; front femora armed beneath on each side with prominent spines. I. PNIRONTIS, p. 543.
 - bb. Joint 1 of antennæ not spined at apex.
 - c. Front femora unarmed; joint 1 of beak nearly twice as long as the others united; apex of head at base of beak unarmed. II. PYGOLAMPIS, p. 545.
 - cc. Front femora armed beneath with two rows of short spines; joint 1 of beak subequal in length to 2 and 3 united; apex of head armed with a short porrect obtuse spine on each side at base of beak. III. GNATHOBLEDA, p. 547.
- aa. Head without branched spines or processes behind and below the eyes, rarely with small simple ones.

- d.* Ocelli not or only slightly elevated; hind portion of head not strongly narrowed into a slender neck; hind femora much surpassing apex of abdomen. IV. STENOPODA, p. 548.
- dd.* Ocelli located on a small protuberance or tubercle above the general level of the head; hind portion of head strongly narrowed into a neck; hind femora not at all or but slightly passing tip of abdomen.
- e.* Joint 1 of beak slightly longer than joints 2 and 3 united; front femora armed beneath. V. SCHUMANNIA, p. 549.
- ee.* Joint 1 of beak not longer than joint 2.
- f.* Front femora thickened, armed beneath with very short spines; joint 1 of beak much shorter than joint 2; hind femora not or just reaching tip of abdomen. VI. ONCOCEPHALUS, p. 550.
- ff.* Front femora but little thickened, unarmed beneath; joints 1 and 2 of beak subequal in length; hind femora slightly surpassing abdomen. VII. NARVESUS, p. 551.

I. PNIRONTIS Stal, 1859b, 381.

Elongate slender species having the antennæ inserted above the cheeks in the ends of the prominent antenniferous tubercles, the tylus usually represented by a pair of short tapering spines between the tubercles; joints 2—4 of antennæ very slender, in repose folded back and with the beak received in a groove beneath the head; hind lobe of head not constricted into a neck, its disk with a longitudinal median groove; ocelli small, not elevated; pronotum with transverse constriction feeble, the sides converging from the base and ending in front in two spines, the lower one the longer; front tibiæ more or less curved, shorter than femora and armed with several spines; hind femora but little surpassing middle of abdomen. Male with last dorsal of abdomen usually deeply cleft, the lobes more or less divergent, their tips usually rounded. Other characters as in key. About a dozen species are known, four of which occur in our territory.

KEY TO EASTERN SPECIES OF PNIRONTIS.

- a.* Front tibiæ armed on inner edge only with three or four spines.
- b.* Basal joint of antennæ unarmed beneath; incisures of connexivals without dark spots; cheeks much surpassing antenniferous tubercles. 516. LANGUIDA.
- bb.* Basal joint of antennæ armed beneath; apical angles of incisures of connexivals both above and beneath with a small black spot; cheeks but slightly surpassing antenniferous tubercles. 517. INFIRMA.
- aa.* Front tibiæ armed on both inner and outer edges, the outer edge with a stout spur and two shorter spines behind it.

c. Antenniferous tubercles nearly as long as basal antennal and with two slender cylindrical processes between them; front tibiæ of male but slightly curved. 518. MODESTA.

cc. Antenniferous tubercles less than one-fourth the length of basal antennal with a single short obtuse spine between them; front tibiæ of male strongly curved. 519. BRIMLEYI.

516 (719). *PNIRONTIS LANGUIDA* Stal, 1859b, 381.

Elongate, slender, subparallel. Color a nearly uniform pale straw-yellow; head sometimes in great part fuscous; membrane and cells of

corium whitish-hyaline, often tinged with reddish. Basal joint of antennæ longer than front lobe of head, the latter beset with minute spicules. Pronotum gradually widened toward base, its hind portion subdepressed and with a median and two lateral shallow grooves, the median one the wider, narrowed in front and extending to apical fourth of disk. Elytra not reaching apex of abdomen. Last dorsal of male transversely wrinkled, its apex deeply and widely cleft, the tips of its lobes subacute. Length, 13—14 mm. (Fig. 131).

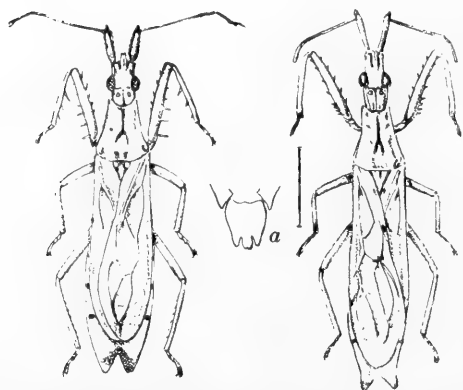


Fig. 130. *Pnirontis infirma* Stal; male X 4. *a.* apex of female abdomen from above. Fig. 131. *P. languida* Stal, male X 4. (After Champion).

Brownsville, Tex., Aug. 15 (*Barber*). Santiago de las Vegas, Cuba, Oct. 15 (*Fracker*). Recorded from St. Augustine, Ft. Myers and St. Petersburg, Fla. Ranges from South Carolina southwest to Texas and the West Indies. Recorded also from Brazil.

517 (720). *PNIRONTIS INFIRMA* Stal, 1859b, 382.

Elongate, slender. Dull straw-yellow; apical joints of antennæ tinged with fuscous; connexivals with apical angles blackish; coxæ brown; basal joint of antennæ as long as front lobe of head, armed beneath with two rows of short spines. Disk of pronotum with a nearly entire median groove, its margins somewhat elevated. Elytra reaching last dorsal. Length, 10—12 mm. (Fig. 130).

Ft. Myers, Fla., March 31; taken at light (*Davis*). Mobile, Ala., Sept. 8 (*Gerhard*). Its known range extends from New Jersey west to Illinois and southwest to Florida, Texas, Cuba and northern Brazil. Not as yet taken, but should occur in southern Indiana. Barber lists it also from LaBelle and Ever-

glade and Bueno from St. Petersburg, Fla. Nothing regarding its habits has been recorded.

518 (721). *PNIRONTIS MODESTA* Banks, 1910a, 324.

Elongate, slender. Dull straw-yellow; apical angles of connexivals each with a very small dark spot; abdomen and median line of pronotum often faintly tinged with fuscous; femoral and tibial spines with a brown bar. Basal joint of antennæ shorter than front portion of head, finely spinose beneath. Antenniferous tubercles slightly surpassed by the two cylindrical processes between them. Front femora with four or five prominent spines, these increasing in length from the base; front tibiæ armed as stated in key. Apex of male abdomen with lobes more divergent, their tips more broadly rounded than in *infirmus*. In female these lobes are wholly separate with an oblong lobe of equal length between them, the tip of latter with a small median notch. Length, 11—12 mm.

Moore Haven, Fla., March 25; one swept from foliage along the canal (*W. S. B.*). Washington, D. C., June 15 (*Davis*). Barber records it from Titusville, Fla., and Van Duzee (1917, 240) from Indiana. The types of Banks were from Virginia.

519 (—). *PNIRONTIS BRIMLEYI* sp. nov.

Form and size of *modesta*. Color much the same; head and basal lobe of pronotum tinged with fuscous; ventrals with a row of small black dots along each side in addition to those on angles of connexivals. Head and pronotum roughly scabrous. Antenniferous tubercles very short, the antennæ inserted beneath them, not apparently on their ends as in our other species; the tylus between them single, obtusely pointed. First joint of antennæ less than half the length of front lobe of head, its basal half swollen, apical half tapering to an obtuse point. Front tibiæ of male strongly curved, armed as in *modesta*. Last dorsal of male broader, with apical notch wider and much more shallow, the lobes scarcely half the length of those of *modesta*. Characters otherwise much as in that species. Length, 10.5 mm.

Raleigh, N. Car., April 14; a single male sent me as *modesta*, but very distinct in the characters above mentioned from that species. Named in honor of C. S. Brimley, of Raleigh, N. Car., who has shown me many favors during the preparation of this work, and who has done much to make better known the insect fauna of his State. Type in collection of North Carolina State Department of Agriculture.

II. *PYGOLAMPIS* Germar, 1824, 22.

Elongate slender species having the head porrect, its sides subparallel, the front lobe as wide as hind one, the base of latter with four short processes; antennæ inserted on its front,

their basal tubercles very short, first joint porrect, as long as or longer than front lobe of head; eyes relatively small, coarsely granulated; pronotum with sides gradually feebly converging from the base, disk with four vague obtuse ridges, the median groove rather deep, the others with short narrow forks; elytra reaching to or slightly beyond base of sixth dorsal; front and middle legs short, their femora and tibiæ unarmed, hind legs longer, more slender, but femora not reaching tip of abdomen. Last dorsal of male broadly emarginate; of female prolonged and tapering to an obtuse tip. About a dozen species are known, two of them from our territory, one from Central America, the others from the Old World. Van Duzee (1917, 241) has listed *P. spurca* Stal, a Surinam species, from the "S. St.", but no other eastern record can be found.

KEY TO EASTERN SPECIES OF PYGOLAMPIS.

- a.* First joint of antennæ subequal in length to front portion of head; front femora distinctly swollen. 520. SERICEA.
- aa.* First joint of antennæ nearly twice as long as front portion of head; front femora but little swollen. 521. PECTORALIS.

520 (723). PYGOLAMPIS SERICEA Stal, 1859b, 378.

Elongate, subparallel. Above fuscous-brown, densely clothed with fine prostrate grayish pubescence; head and pronotum somewhat paler; larger cells of membrane with an irregular whitish line; incisures of connexivum each with a small pale spot; abdomen dull yellow with a median line and a narrow one each side fuscous; beak, apical joints of antennæ, sterna, coxæ, knees and front and middle femora fuscous-brown; basal joint of antennæ and remainder of legs reddish-brown, the front and middle tibiæ annulate with paler. Tylus with apex projected forward from between a short fork. Length, 13—15 mm.

Lake Co., Ind., May 5 (*Gerhard*). Raleigh, N. Car., May 5 (*Brimley*). Wilmington, N. Car., April 18 (*Davis*). Described from Pennsylvania. Ranges from New England west to Illinois and southwest to South Carolina and Texas. But few stations are on record.

521 (724). PYGOLAMPIS PECTORALIS (Say), 1832, 33; I, 306.

Elongate, slender. Pale reddish-brown or dull brownish-yellow, sparsely clothed with fine silvery pubescence; apical joints of antennæ and elytra, especially the membrane, strongly tinged with fuscous; apical angles of connexivals each with a small pale spot; meso- and metasterna and sometimes the middle of abdomen, fuscous; tibiæ annulate with pale and dark rings. Joint 2 of antennæ longer than 1, 3 shortest, one-half the length of 4. Pronotum longer than in *sericea*, the disk of hind lobe

more uneven, with grooves and ridges poorly defined. Spine in front of each fore coxæ prominent. Length, 13—16 mm.

Frequent throughout Indiana, more so in the southern counties; occurs throughout the year. Bassenger, R. P. Park and Dunedin, Fla., Dec. 18—March 24. Listed from eight other stations in that State. In Indiana it hibernates, both as nymph and adult, singly or in pairs, beneath chunks, boards and other cover, along roadsides and borders of upland woods. In summer I have found it in small colonies beneath loose bark of oak stumps in high dense woodlands and beneath rotten chunks in damp places. In Florida the nymphs have been sifted from weed debris in low moist grounds, and the adults found beneath bark. It is a species of wide distribution, having been recorded from all parts of the United States. Nothing regarding its habits is on record.

III. GNATHOBLEDA Stal, 1859b, 380.

Elongate-oval species having the head and pronotum subequal in length, the former, in our species, with spines on lower sides of hind lobe fused into two or three forked processes; joint 1 of antennæ slightly shorter than head, not spined at apex; disk of pronotum with a vague transverse median impression and four obtuse longitudinal carinæ; elytra subequal in length to abdomen, male, somewhat shorter, female; front femora strongly swollen, armed beneath with two rows of short spines. One species occurs in Central America, a second in Mexico and a third in Cuba and the southern states.

522 (725). GNATHOBLEDA TUMIDULA Stal, 1872, 121.

Elongate-oval. Pale straw-yellow, subglabrous; basal lobe of head, a vague median stripe on pronotum, scutellum, small spot at apex of front discal cell of corium, another near middle of outer cell of membrane, and the apical third of each connexival, fuscous-brown; front femora pale brown flecked with small yellow spots, middle and hind ones straw-yellow, their apical fourth brown; tibiæ dull yellow annulate with two or three brown rings; under surface pale brown flecked with numerous yellowish spots and dots. Antennæ with joint 1 and basal half of 2, straw-yellow, remainder fuscous-brown; 1 rather slender, narrowed toward base; 2 more slender, nearly twice as long as 1; 3 and 4 united about one-half the length of 2, 4 nearly one-half longer than 3. Front of head ending in a pair of obtuse spines between the bases of antennæ. Pronotum with lateral carinæ of disk forked or branched and lower front angle of flanks ending in a prominent spine. Hind femora of male slightly passing apex of abdomen, the latter rounded; female with hind

femora not reaching apex of abdomen, the latter acutely produced. Length, 11.5—14.5 mm.

Dunedin, Fla., Feb. 22—March 4; several nymphs in last instar sifted from weed debris along the margins of wet hammocks. Santiago las Vegas, Cuba, Oct. 26 (*Fracker*). Recorded from Georgia and Texas.

IV. STENOPODA Laporte, 1832, 26.

Elongate, rather stout species having the sides of head subparallel, the front portion slightly wider and three times longer than hind one, both it and pronotum with numerous bristly setose hairs or slender spines; antennæ with similar hairs, inserted on sides of apical fourth of head far in advance of eyes, the bifurcate tylus between their bases; eyes small but prominent; scutellum small, its apex acute; elytra usually reaching middle of last dorsal, sometimes abbreviated and reaching only third dorsal; abdomen wide, subdepressed above; legs slender, the hind ones much the longer, all thickly beset with very fine setose bristles; ventral surface of abdomen strongly carinate at middle; last dorsal flat with apex truncate, male, conical with apex obtuse, female. Three species are known, all tropical or neotropical, one ranging northward into our territory.

523 (727). STENOPODA CINEREA Laporte, 1832, 26.⁶⁷

Elongate, robust for the subfamily. Dull straw-yellow; apical joints of antennæ, membrane of elytra and sides of abdomen often tinged with fuscous; femora with vague fuscous dots and streaks, their apical fourth darker. Beak with joint 1 subequal to 2 and 3 united. Joint 1 of antennæ not much swollen, as long as head, 2 one-third longer, 3 and 4 subequal, each one-half the length of 1. Pronotum subcampanulate, much wider behind, its disk with two obtuse ridges, these divergent toward base, front angles acute, hind ones ending in a short suberect obtuse spine. Front femora armed beneath with two rows of very short tubercles. Length, 22—30 mm.

Dunedin and R. P. Park, Fla., February—March, nymphs only; beaten from dead leaves of cabbage and royal palms and sifted from weed debris (*W. S. B.*). Lakehurst, N. J., and Yaphank, N. Y., July (*Davis*). Mobile, Ala., and Havana, Cuba, June (*Gerhard*). Henderson, Ky., June 1 (*Marshall*). Raleigh, N. Car., July 11—Sept. 14 (*Brimley*). In five of the eight

⁶⁷Usually listed as *Stenopoda culiciformis* Fabricius (1775), it having been described by that author as *Cimex culiciformis*. This name, however, had already been used by De Geer (1773) for the Ploiarid now known as *Empicoris culiciformis* (De G.). Laporte's name is therefore the next one available for the species.

adults at hand the discoidal cell of elytra is marked with a short black line, and in three the inner margin of clavus is in great part black. The largest specimen, a female from Raleigh, is brachypterous. The known range of this species extends from New York west to southern Illinois and Arkansas, and southwest to Florida, Texas, Panama and Central America. Barber records it from six stations in Florida, including St. Augustine, Marco and Miami. It is the largest member of the Stenopodinæ and its long hind legs give it somewhat the aspect of a giant mosquito, whence the old specific name. Uhler (1884, 279) states that: "It, as well as its young, lurks about the branches and twigs of trees, watching for caterpillars and other insects upon which to leap and transfix with the curved acute rostrum, and while holding one between the fore femora and tibiæ, soon sucks it to death."

V. SCHUMANNIA Champion, 1898, 185.

Elongate, narrow species having the head subcylindrical, the front and hind portions subequal in length, the sides of the latter slightly rounded and armed with four laterally projecting stout setiferous spines; eyes rounded, very prominent; cheeks ending in moderately long divergent porrect spines; antennæ short, joint 1 about as long as front portion of head; pronotum about twice as long as broad, its sides feebly converging from base to middle, then subparallel, their front angles unarmed; scutellum with an erect tubercle at apex; elytra reaching tip of abdomen, their inner margin strongly sinuate before the apex, the latter pointed; front femora strongly swollen, armed beneath with two rows of very short spines and a few longer ones near base; front tibiæ as long as the femora and with a short spongy fossa beneath the apex. But one species is known.

524 (726). SCHUMANNIA MEXICANA Champion, 1898, 185.

Dull grayish-yellow, mottled with fuscous; head with a blackish median stripe, this forming two lines in front; front lobe of pronotum fuscous, disk with a median black line; scutellum black; inner half of corium with an interrupted oblique fuscous streak, outer half with a pale grayish one; membrane with a row of small blackish spots on outer cell; connexivum spotted with black; legs dull yellow, flecked with fuscous; tarsi and tips of tibiæ fuscous; spines on front trochanters and femora, black, conspicuous. Antennæ dull yellow, pilose, joint 1 much stouter than and one-half as long as 2, 3 short, very slender. Pronotum

with front lobe much shorter than hind one, the latter with median longitudinal groove, a shorter sinuous subbasal one each side and a deep fovea at middle. Abdomen gradually widened to middle, outer apical angles of the segments dilated. Ventrals 1—3 carinate at middle. Length 18 mm. (Fig. 132).

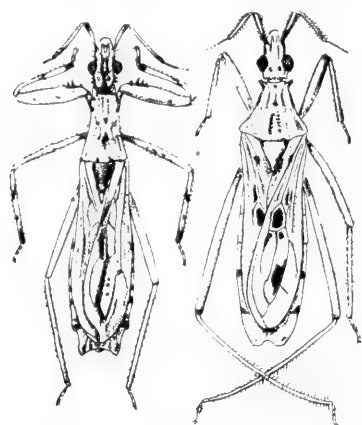


Fig. 132. *Schumannia mexicana* Champ., male X 2½. Fig. 133. *Narvesus carolinensis* Stal, female X 3. (After Champion).

Described from Mexico. A single specimen, taken by Franklin Sherman at Raleigh, N. Car., June 28, 1902, is in the U. S. National Museum.

VI. ONCOCEPHALUS Klug., 1830, 2.

Elongate-oval species having the head porrect, its front portion subcylindrical, twice as long as hind one, the latter subglobose, suddenly constricted into a short neck; eyes large, very prominent, subcontiguous beneath; ocelli large, placed on the sides of a prominent bilobed tubercle; front lobe of pronotum much narrower than hind one, its sides sinuate; apex of scutellum ending in a cylindrical horizontal spine; elytra entire, reaching tip of abdomen; connexivum narrowly or not at all exposed; front femora much swollen, armed beneath on inner edge with a row of short spines or tubercles; front tibiæ slightly longer than femora, beset with short fine bristles; abdomen with a sharp median carina. Three species are known from North America, two occurring in our territory.

KEY TO EASTERN SPECIES OF ONCOCEPHALUS.

- a. Head and front femora in great part black; side margins of pronotum with front and hind angles each ending in a small conical tubercle, and with a third small tubercle near middle. 525. GENICULATUS.
 - aa. Head and front femora pale, the apical third of latter sometimes tinged with fuscous; side margins of pronotum without tubercles, the hind angles rounded. 526. APICULATUS.
- 525 (728). ONCOCEPHALUS GENICULATUS Stal, 1872, 123.

Elongate-oval. Hind lobe and under part of front lobe of head, disk of hind lobe of pronotum, scutellum, a large spot on discoidal cell of elytra and a dash behind it, black; antennæ fuscous, the basal joint

darker but pale at base; front femora, except middle, knees of middle and hind femora and two broad rings on front and middle tibiæ, fuscous-black; elytra fuscous, finely maculate with paler; beak fuscous, with two pale rings; under surface dull yellow, irregularly marked with fuscous streaks and blotches. Antennæ inserted in front of cheeks, joint 1 glabrous, scarcely as long as front portion of head; joints 2—4 thickly beset with erect stiff hairs, 3 and 4 subequal, very slender, united less than half the length of 2. Apex of last dorsal of male with a small median notch. Length, 14—15 mm.

Royal Palm Park, Fla., Dec. 12; one nymph in last instar taken from beneath a board by the side of a ditch (*W. S. B.*). White Lake, N. Car., June (*Brimley*). Mobile, Ala., June 4 (*Gerhard*). Stal's types were from Texas, and it has been recorded elsewhere only from St. Petersburg and Everglade, Fla., and Pueblo, Colo.

526 (729). *ONOCOCEPHALUS APICULATUS* Reuter, 1882, 728.

Elongate, subparallel. Color a nearly uniform dull brownish-yellow; antennæ, scutellum, a median stripe on pronotum, a short line on middle of edge of each connexival and apical fourth of femora fuscous or tinged with fuscous. Disk of pronotum with two obtuse longitudinal ridges extending from middle of front lobe to middle of hind one, its front angles obtuse, hind ones obtusely rounded. Spines of inner lower margin of front femora more numerous and slightly longer than in *geniculatus*. Length, 16 mm.

Hamilton Co., Kan. (*Brimley*). Described from Missouri. Recorded by Malloch (1920, 240) from Illinois. Not known elsewhere.

VII. *NARVESUS* Stal, 1859b, 383.

A monotypic genus, differing from *Oncoccephalus* mainly by the characters given in generic key. Front portion of head shorter. Male with eyes larger, almost contiguous beneath; antennæ pilose throughout, and last dorsal with apex subtruncate, its median notch U-shaped. Female larger, with eyes smaller, more separated beneath; ocelli less elevated, basal joints of antennæ less pilose.

527 (731). *NARVESUS CAROLINENSIS* Stal, 1859b, 385.

Elongate, subparallel. Dull straw-yellow; antennæ, ocellar tubercles, scutellum, clavus, a large spot on discoidal cell of corium, and an oblong one on outer cell of membrane, fuscous-brown or tinged with fuscous; under surface with some vague, irregular fuscous markings. Joint 1 of antennæ half the length of 2. Pronotum almost as wide at base as long, strongly narrowed from base to apex, front angles ending in a

sub-erect acute tubercle, hind ones obtuse or subacute. Length, 14—17 mm. (Fig. 133).

Daviess Co., Ind., June 15 (*W. S. B.*). Raleigh, N. Car., July; Cochise County, Ariz., August (*Brimley*). Resembles *O. apiculatus* Reut. very closely in form and color. Ranges from New Jersey west to Missouri and southwest to Florida, Arizona, Yucatan and the West Indies. A specimen in the Gainesville collection from Lake City is the only one recorded from Florida. Except that it occurs at light, nothing regarding its habits has been recorded.

Subfamily IV. REDUVIINÆ Amyot & Serville, 1843, 333.

This subfamily includes species of large size and elongate-oval form having the front of head narrow, either porrect or subdeflexed; eyes large, coarsely granulated; antennæ slender first joint shorter than second; hind lobe of pronotum much wider than front one; apex of scutellum prolonged as a horizontal spine; elytra entire, reaching or surpassing tip of abdomen, their tips rather narrowly rounded; legs short, front femora unarmed. Other characters as in key. The subfamily is represented in Tropical America by a dozen or more genera, only four of which occur as far north as the United States. Two of these are represented in our territory.

KEY TO EASTERN GENERA OF REDUVIINÆ.

- a.* Front of head subdeflexed; antennæ inserted on top of the head close to the front margin of eyes, their basal tubercles small; beak stout, distinctly curved. I. REDUVIUS.
- aa.* Front of head porrect, prolonged; antennæ inserted on sides of head much in front of eyes, their tubercles prominent; beak rather slender, nearly straight. II. TRIATOMA.

I. REDUVIUS Fabricius, 1775, 729.

Large elongate-oval pubescent species having the front of head short, deflexed, hind part constricted close behind the eyes to form a distinct neck; eyes very large, narrowly separated beneath; ocelli placed close together near hind margin of eyes; second joint of beak much longer than the others united; pronotum as long as wide, its front lobe convex and with a median impressed line, hind one with an obtuse ridge each side of middle; scutellum bicarinate, the carinæ merging to form the apical spine. One species occurs in our territory and another in Arizona.

528 (733). *REDUVIUS PERSONATUS* (Linnæus), 1758, 446.

Elongate-oval. Color a nearly uniform piceous-brown, the knees, tarsi and apical halves of tibiæ paler; elytra largely membranous, more or less translucent. Antennæ with joints gradually decreasing in thickness, 1 and 4 subequal in length, each about two-thirds the length of 2 or 3, which are also subequal. Length, 17—20 mm. (Fig. 134).

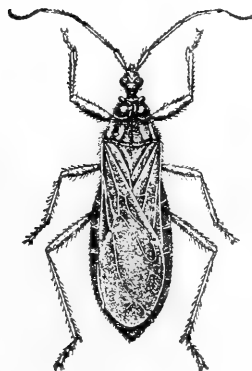


Fig. 134, X 2.
(After Brehm).

Cass, Kosciusko, Marion, Putnam and Vigo counties, Ind., June 11—July 9; probably occurs throughout the State. Borden Springs, Ala., Aug. 15. This is a palæarctic European species, ranging in this country from Quebec and New England west to Kansas and south to Florida, where it has been recorded from Bellaire and Jacksonville. It occurs for the most part in houses, and is known as the “masked bed-bug hunter,” both adults and nymphs covering themselves with lint and dust and hiding in corners and crevices in waiting for their unsavory prey. In Indiana the adults are most common in June, flying to light at dusk. Fracker (1913, 229) states that this is “our very notorious kissing-bug.” In this he was mistaken, that honor belonging to *Melanolestes picipes* H.-S. However, Leconte (1855) stated that: “When caught or unskillfully handled it always stings with its beak. In this case the pain is almost equal to that of the bite of a snake, and the swelling and irritation which result from it will sometimes last for a week. Its food consists of flies and other soft insects which it catches very adroitly and soon deprives of all their juices.”

II. *TRIATOMA* Laporte, 1832, 11.

Rather large elongate-oval, subglabrous species having the front part of head very long, porrect, subcylindrical, hind part constricted to a neck some distance behind the eyes; ocelli widely separated, distant from the eyes; hind lobe of pronotum with humeral angles broadly rounded; front lobe convex, usually with a small tubercle each side of the impressed median line; apex of scutellum prolonged as an obtuse more or less cylindrical horizontal spine; prosternum deeply sulcate, declivent in front; abdomen widely expanded, the connexivum broadly exposed and reflexed. Twenty or more species are

known, mostly from tropical countries. They are for the most part large varicolored species. Some of them attack man, and one, the *Triatoma megista* Burm., has in the past caused much loss of life among the natives of Brazil. Two species and one variety are known from the eastern states.

KEY TO EASTERN SPECIES OF TRIATOMA.

- a. Beak glabrous or nearly so, joint 2 twice or more as long as 1; tubercles at apical angles of pronotum conical, subacute. 529. SANGUISUGA.
- aa. Beak pilose with numerous long inclined hairs, joint 2 only a third longer than 1, the latter much longer than 3; tubercles at apical angles of pronotum obtuse, only slightly elevated. 530. HEIDEMANNI.

529 (738). *TRIAMATA SANGUISUGA* (Leconte), 1855, 404.

Elongate-oval, broadest behind middle of abdomen. Piceous-black or dark brown; narrow front and side margins of pronotum, basal fourth and a spot on apical third of corium, reddish-yellow; connexivum, both above and beneath, with alternate red and black bars; legs and antennæ dark brown. Antennæ with scattered bristly hairs, joint 1 not reaching tip of tylus, one-third the length of 2, 3 and 4 more slender, subequal, each one-half the length of 2. Hind lobe of pronotum with numerous coarse transverse wrinkles and two divergent carinæ. Tibiæ all clothed beneath with bristly hairs. Length, 16—21 mm. (Fig. 135).



Fig. 135, X 2.
(After Howard and Marlatt).

Crawford Co., Ind., July 1—6. Dunedin, Sanford and R. P. Park, Fla., Dec. 15—April 3. Recorded from ten additional Florida stations. The two Indiana specimens were taken from beneath loose bark of oak. The Florida adults are smaller than those from Indiana, and represent the var. *ambigua* Neiva (1911, 422). He says: "Examples which come from Florida are characterized by their smaller size and by their color, which is much duller, chiefly on the connexivum, which is at times completely ochraceous."

My specimens were taken from beneath boards and by sweeping weeds in damp places; the nymphs from beneath bark of pine and oak. *T. sanguisuga* ranges from Maryland and New Jersey west to southern Illinois and southwest to Florida, Texas and Panama. It is known in the southern states as the "big bed-bug"; also as the "blood-sucking cone-nose."

Leconte's types were from Georgia, and following his original description he says: "This insect inflicts a most painful wound. It is remarkable also for sucking the blood of mammals, particularly of children. I have known its bite to be followed by very serious consequences, the patient not recovering from its effects for nearly a year." Marlatt (1896, 38) has given an excellent account of its life history and habits. He states that:

"It feeds on bed-bugs, especially those already charged with human blood, and has a 'buggy' odor, even more intense than that of the bed-bug. In country places, especially in the lower Mississippi Valley, it is often found in bed rooms and its bite is very severe and painful, resulting in much more pronounced swelling and inflammation than in the case of the bed-bug. It is a night flyer and is attracted into open windows by light. It conceals itself during the day under any loose object, often leaving beds which it may have frequented during the night."

530 (736). TRIATOMA HEIDEMANNI Neiva, 1911a, No. 44.

Form and size of *sanguisuga*. General color dark reddish-brown; scutellum, hind lobe of head and front one of pronotum, piceous-black; side margins of hind lobe of pronotum, costal margin and basal fourth or less of corium and a spot near apex of latter, dull yellow; membrane pale to dark brown, a triangular spot in front of its base paler; apical third of each connexival both above and beneath, dull reddish-yellow. Joints 1 and 2 of antennæ brown, 2 thickly beset with long appressed bristly hairs; 3 and 4 straw-yellow, beset with numerous long, slender flying hairs; 2 but slightly longer than either 3 or 4, which are subequal in length. Pronotum with disk of hind lobe much smoother and carinæ lower and more obtuse than in *sanguisuga*. Third joint of beak much shorter and more obtuse, and spine of scutellum shorter and less cylindrical than in *sanguisuga*. Length, 18—22 mm.

Lake Landing, Hyde County, N. Car., Aug. 25 (*Brimley*). Riley Co., Kan., April 6 (*Barber*). Ranges from Maryland west to southern Illinois and Oklahoma and southwest to Florida and Texas. This is the species treated by Stal, Fracker and most American authors as *variegata* Drury, that name belonging to an Antigua species not represented in this country. Some of the American records of *variegata* belong to *sanguisuga* and the southwestern ones probably to the *T. neotomæ* and *occulta* Neiva, described from Arizona and Texas. The only probable Florida record of *heidemanni* is that of Uhler (1878, 428) as *variegata* without definite station. No mention of its habits can be found. Easily distinguished from *sanguisuga* by the hairy beak.

Subfamily V. **PIRATINÆ** Amyot & Serville, 1843, 321.

This subfamily comprises large or medium sized species having the hind portion of head short, subglobose, abruptly constricted into a short neck, front portion short, usually more or less deflexed; eyes large, coarsely granulated; antennæ usually inserted on top of head some distance in front of eyes, their first joint shortest, scarcely or not surpassing tip of tylus; pronotum constricted much behind the middle, its front lobe much the narrower; elytra often wanting, when present as long as or slightly shorter than abdomen; front and middle femora more or less thickened, the front, and usually the middle, tibiæ ending in a short oval plate which is concave and spongy beneath. Three genera are represented in North America, all in our territory.

KEY TO EASTERN GENERA OF PIRATINÆ.

- a.* Front of head short, deflexed; neck with a small tubercle each side; middle tibiæ with a spongy fossa at apex; ocelli narrowly separated.
- b.* Apical fourth of front tibiæ angularly dilated beneath in front of the short spongy fossa; elytra wholly black or piceous.
I. **MELANOLESTES**, p. 556.
- bb.* Front tibiæ but little dilated near apex in front of the elongate spongy fossa; corium and membrane of elytra with a yellow spot.
II. **RASAHUS**, p. 559.
- aa.* Front of head long, porrect; neck without tubercles; middle tibiæ without a spongy fossa; ocelli widely separated.
III. **SIRTHENEA**, p. 560.

I. **MELANOLESTES** Stal, 1866, 251.

Elongate-oval species possessing the characters above given and having the ocelli placed on slight elevations between the hind margins of eyes; antennæ with joints 2—4 subequal in length, hirsute with numerous erect hairs and gradually decreasing in diameter, each double the length of 1; front portion of pronotum impunctate, but with a median line, each side of which is a straight and two shorter oblique shallow grooves; scutellum obtusely carinate each side, the carinæ merging to form the short obtuse terminal spine; spongy fossa of front tibiæ elongate-oval, very large. Two of the four known species occur in the eastern states.

KEY TO EASTERN SPECIES OF MELANOLESTES.

- a.* Abdomen wholly black; ocelli small, piceous; elytra often much abbreviated.
531. **PICIPES**.

aa. Abdomen in part or wholly red; ocelli much larger, yellow; elytra entire. 532. ABDOMINALIS.

531 (745). *MELANOLESTES PICIPES* (Herrich-Schaeffer), 1848, 62.

Elongate-oval. Black or piceous-black; antennæ and legs piceous. Interocular area of head, viewed from above, broader than the eyes. Hind portion of pronotum very finely rugose-granulate, the lateral angles rounded. Elytra of females often abbreviated to mere pads which do not surpass the second dorsal. Length, 15—20 mm. (Figs. 136 and 137).

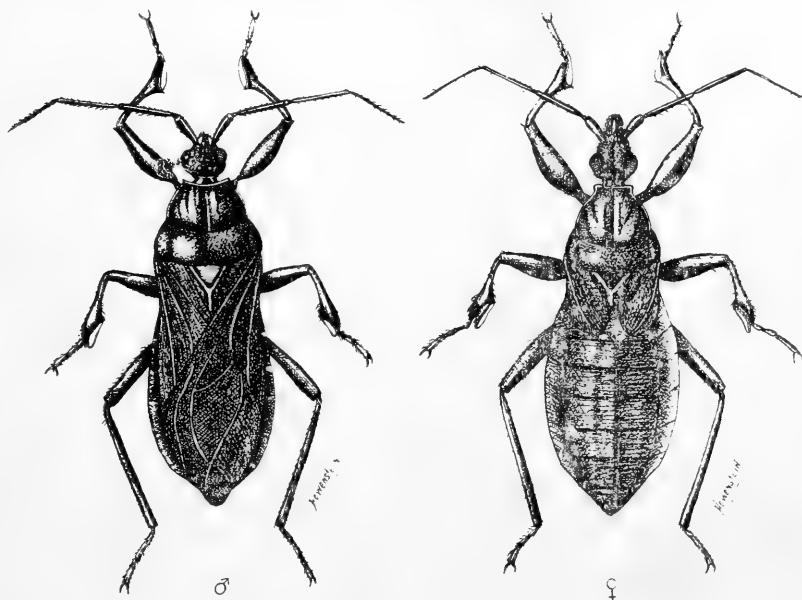


Fig. 136. *Melanolestes picipes* (H. S.), macropterous male X 3. Fig. 137. Same, brachypterous female. (After Lugger).

Frequent throughout Indiana, more so in the southern counties; also throughout Florida. In Indiana it is found in all months of the year, hibernating singly or in pairs in dry upland woods and fields, beneath logs, the sides of which are deeply buried in leaves and mold. In spring and summer it occurs beneath stones, loose bark, piles of weeds and other cover. In Florida it is more often found beneath cover along the margins of ponds and lakes than in dryer places. Of 20 specimens at hand 12 are fully winged, ten of which are males; of the eight with wings abbreviated all are females, so that wing abortion appears to be largely a sexual character.

The known range of *M. picipes* extends from Quebec and New England west to Minnesota and south and southwest to Florida,

Texas and California. Uhler has also listed it from Para, Brazil, and Walker (1873, 97) from Venezuela and Colombia. From personal experience I long ago learned to pick up this and allied species of Reduviids only with the forceps, as I have on several occasions been severely punctured by their beak. Smith (1910, 154) states that this and the next species made a temporary stir in 1899 as "kissing bugs," because of a number of reported cases where bites had caused swelling of the lips. "These species bite very readily and if, in flight, they strike the face of an individual, they are very apt to puncture promptly. There is no doubt that some such cases did occur; there is no doubt either that the majority of the reported cases were attributable to altogether different causes."

532 (746). *MELANOLESTES ABDOMINALIS* (Herrich-Schaeffer), 1843, 63.

Form similar to *picipes*, but averaging smaller. Head, pronotum and sterna black; scutellum, corium, antennæ and legs brown; membrane darker brown; abdomen, except genital segment of male, red; tarsi dull yellow. Structural characters as under generic heading. Length, 13—18 mm.

Frequent in southern Indiana, April 1—Dec. 18; not taken north of Vigo County. Hibernates beneath partly buried logs and at other seasons found in similar places as *picipes*. All of the 14 specimens at hand, eight of them females, are fully winged. The general range of this species is about the same as that of *picipes*, extending from New England west to South Dakota and south to Mississippi, Texas, California and Mexico. Not as yet recorded from Florida, though it probably occurs in the northern portion of that State.

There is some doubt about the status of *M. abdominalis*. Stal (1872, 107) placed it as a color variety of *picipes* and it is so regarded by Parshley (1918, 64) who states that he not only has all gradations between the two forms, but a pair taken in coitu, the male being *picipes*, the female, *abdominalis*. On the other hand Uhler (1876, 330) regarded them as distinct, stating that "they sometimes occur under the same stone, but while I have seen the sexes of each united, I have never seen a male of the one caress or unite with a female of the other." The two forms are treated as distinct both in the Van Duzee Catalogue and the "Hemiptera of Connecticut" and as I have not, in all my collecting, seen a specimen with intermediate hues, they are here treated as separate species.

II. RASAHUS Amyot & Serville, 1843, 325.

This genus is very close to *Melanolestes*. The eyes are larger and more convex; ocelli larger, more oval and set diagonally on a bilobed tubercle; scutellar spine compressed, longer and more slender; spongy pads of front tibiæ oblong and more projecting. Other differences as in generic key. A half dozen or more species are known from tropical America, two of which occur in our territory.

KEY TO EASTERN SPECIES OF RASAHUS.

a. Inner portion of basal half of corium as far as tip of clavus, yellow; clavus black at base, its apical half or more yellow; body of male narrow, the connexivum narrowly or not at all exposed.

533. HAMATUS.

aa. Basal half of corium and the clavus both in great part yellow; body broad, the connexivum widely exposed in both sexes.

534. BIGUTTATUS.

533 (749). RASAHUS HAMATUS (Fabricius), 1781, 381.



Fig. 138. Male
X 2. (After
Champion).

Elongate, subparallel, male; suboval, female. Head, pronotum and scutellum usually black; apical third or more of clavus and an oblique stripe on inner side of basal half of corium dull yellow; remainder of corium and membrane dark brown, the latter with a large oval yellow spot on base; connexivum, both above and beneath, with alternate wide black and yellow bars, female, the dark ones narrow or sometimes wanting, male; legs reddish-yellow, the front and middle femora paler at base with lower face and upper half of outer one sometimes fuscous-brown; sterna black, ventrals fuscous-brown. Joints 1, 3 and 4 of antennæ fuscous, 2 dull yellow; 1 shorter than head; 2—4 subequal in length, each two and half times as long as 1. Head and pronotum with long scattered hairs. Front lobe of pronotum with seven more or less distinct shallow grooves, the two on each side oblique. Length, 17—20 mm. (Fig. 138).

Dunedin and R. P. Park, Fla., Feb. 25—April 22; a dozen or more specimens taken beneath boards in damp places or by sweeping along the borders of wet hammocks; two at electric porch light. Everglade, Fla., July (*Davis*). Brownsville, Tex., June (*Barber*). Recorded also from Silver Springs, Punta Gorda and Ft. Myers, Fla. A neotropical species known in this country only from Florida and Texas, and ranging south to Argentina.

534 (747). *RASAHUS BIGUTTATUS* (Say), 1832, 13; I, 307.

Very similar to *hamatus*; the chief differences as in key. Color variable, the head and pronotum often reddish-brown, sometimes with front half of latter black and hind one brown. Membrane blackish with a large oval or rounded yellowish spot at middle. Connexivum in both sexes with wide alternate blackish and yellow spots; legs usually reddish-yellow, paler at base, often in great part blackish. Length, 16—20 mm.

Everglade, Fla., April (*Davis*). Delhi, Cal., May 6 (*Gerhard*). Recorded by Barber from eight Florida stations between Ormond and Everglade. Ranges from North Carolina southwest to Florida, Louisiana, Texas and the West Indies. It is very doubtful whether Say's species is more than a color form of *hamatus*. Both vary widely in the yellow markings of elytra and legs. The only structural difference between the two seems to be the narrower form of the males of *hamatus*.

III. *SIRTHENEA* Spinola, 1840, 100.

Elongate, rather robust species having the front of head prolonged, porrect, its sides declivent and tylus forming a ridge along the crest; eyes rather small, not prominent; beak with second joint longer than the others united; pronotum with front lobe but little narrower than hind one, the former with seven, the latter with two sulci; elytra, when present, somewhat shorter than abdomen; front coxæ stout, nearly as long as head; front femora and tibiæ bristly hairy, much swollen, flattened within, the latter with apical spongy plate very large; middle and hind legs short, stout. One species is known from North America and our territory.

535 (750). *SIRTHENEA CARINATA* (Fabricius), 1798, 545.

Elongate, subparallel. Head, pronotum, scutellum and under surface black or piceous; clavus, inner margin of corium and membrane dark brown; corium, except inner margin, beak and legs, reddish-yellow; antennæ fuscous, the basal joint yellow; connexivum with margin, both above and below, in part reddish-yellow. Head and margins of pronotum with numerous erect hairs. Basal joint of antennæ stout, subclavate, slightly curved, reaching tip of tylus; joints 2 and 4 subequal in length, 3 one-third shorter than either. Scutellum with an obtuse ridge each side, these merging to form a short, compressed apical spine. Sides of abdomen strongly reflexed. Length, 18—25 mm.

Vigo and Posey counties, Ind., Feb. 21—Sept. 9, nymphs only. Ormond, Moore Haven, R. P. Park, Sarasota and Dunedin, Fla., November—April. Although I have taken scores of

nymphs of this species, I have happened upon but one adult, from which the above description is drawn. In Indiana the nymphs occur beneath logs or stones, usually in damp places. In Florida the adult and nymphs have mostly been found beneath boards along the margins of ponds, though one nymph was taken from the flowers of *Garberia fruticosa* (Nutt.). It has been recorded only from St. Petersburg, Clearwater and Enterprise, that State, Van Duzee having taken one at electric light in Clearwater, which "bit viciously when captured, producing a wound as painful as that inflicted by the *Notonectas*." The nymphs of all stages have the ocelli wanting and are largely reddish-yellow in hue, only the head, wing-pads, some spots on abdomen, and antennæ being darker. The known range of this bug extends from New Jersey west to Michigan and southern Illinois, and south to Florida, Texas, California and Mexico. But little regarding its habits has been recorded, the majority of specimens mentioned having been taken at light.

Subfamily VI. ECTRICHODIINÆ Amyot & Serville, 1843, 342.

Medium sized oval or elongate-oval species having the head porrect, declivent in front, its hind portion constricted to form a distinct neck; antennæ 8-jointed, the usual third joint being divided into two, and the fourth joint into four; pronotum constricted slightly in front of middle, its disk with an impressed median line and hind lobe with a groove each side; scutellum broad, its apex ending in two short decurved spines; elytra of females often much abbreviated, in males usually reaching tip of abdomen; connexivum widely exposed and reflexed; spongy pad of front and middle tibiæ very short. The species are chiefly tropical, the majority of them inhabiting the Old World. Of the six American genera but two have been recorded from North America, and one of them probably erroneously.⁶⁸

I. RHIGINIA Stal, 1859b, 176, 181.

Oblong-oval species having the hind portion of head short, hemispherical, the ocelli placed on the sides of a small eleva-

⁶⁸Stal (1864a, 59) described *Pothea anconitens* from a specimen in the Signoret collection labelled "America borealis." Later (1872, 104) he said: "In America boreali vix occurrit." Uhler in his Check List recorded it from the "Southern States," and Banks in his Catalogue from the "western states." No other record of its occurrence in this country can be found and, since apparently no other specimen is known, it is not included as a member of our eastern fauna.

tion near its middle; eyes small, rather finely granulated; joint 1 of antennæ much surpassing tip of tylus, about half the length of joint 2; beak strongly curved, joints 1 and 2 subequal; hind lobe of pronotum smooth and with a curved groove each side; scutellum short, broad, rugose; sixth dorsal and ventral of male united to enclose the suborbicular convex genital plate. Eight species are known, seven from tropical America, the other from our territory.

536 (751). RHIGINIA CRUCIATA (Say), 1832, 33; I, 358.

Oblong-oval, widest behind the middle. Head, pronotum in great part, connexivum and abdomen (in male) reddish or reddish-yellow; scutellum black; a bilobed spot on disk of hind lobe of pronotum, antennæ, sterna and elytra, except extreme base of corium, fuscous-brown; legs dull yellow, the apical fourth of femora and tibiæ black or brown; abdomen with a row of brown or black spots along the sides, in female sometimes almost wholly piceous-brown. Structural characters as under subfamily and generic headings. Length, 12—16 mm.

Southern third of Indiana, scarce, April 23—Sept. 24; not taken north of Lawrence and Jennings counties. Ft. Myers, R. P. Park, Moore Haven and Dunedin, Fla., March 1—April 5. In Indiana it has been found only beneath logs on the slopes of open woods; in Florida it was taken by sweeping vegetation and beating dead pine tops and palmetto leaves. Recorded from six additional stations in Florida and doubtless occurs sparingly throughout that State. It is a species of southern distribution, its range extending from New Jersey west to southern Illinois and south to Florida, Texas, Mexico and Cuba. Except that it occurs beneath logs in winter, nothing has been recorded of its habits.

Subfamily VII. HAMMACERINÆ Stal, 1859c, 328.

Large subdepressed species having the front of head broad, porrect, the cheeks surpassing tylus; eyes large, very protuberant; head abruptly constricted just behind eyes, and immersed in thorax almost to their margins; pronotum constricted about the middle, its disk granulate, but without impressed lines, front lobe narrower than hind one, its sides rounded; scutellum short, granulate, its apex ending in two short blunt processes with a notch between them; elytra entire, reaching tip of abdomen; connexivum rather broadly exposed; legs short, bristly hairy, front coxæ short; both front and middle tarsi ending in a short oval lobe, this spongy beneath; ventral segments 2—5

with a median groove. Two genera are known, both represented in North America, but only one in our territory.

I. HAMMACERUS Laporte, 1832, 79.

The members of this genus possess the characters set forth above and have the front lobe of head over twice as long as the distance between the eyes; antennæ inserted on its sides about the middle, their first joint very short, second elongate, flexible,

composed of 23—28 short segments, thus resembling in structure the antennæ of the Blattidæ or cockroaches, third and fourth joints more slender, subequal, each about one-half the length of second. Six species have been described, five from Tropical America, the other from our territory.

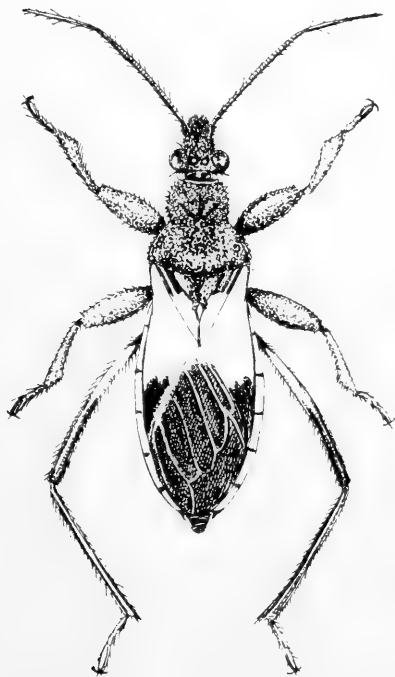


Fig. 139. X 2. (Original).

537 (754). HAMMACERUS PURCIS (Drury), 1782, 63.

Elongate - oval, subdepressed. Head, pronotum and scutellum black, feebly shining; elytra with a broad yellowish - white cross - bar covering the basal third or more, remainder fuscous-brown; connexivum red, the incisures narrowly black; under surface, legs and antennæ fuscous-brown; basal halves of hind femora red. Structural characters as above given. Length, 22—30 mm. (Fig. 139).

Crawford and Posey counties, Ind., Sept. 5—Nov. 17; frequent beneath loose bark of various kinds of trees; also at light. Ormond, Sanford, R. P. Park, Sarasota and Dunedin, Fla., Nov. 29—March 24; occurs sparingly throughout that State beneath bark of dead pine and oak. The known range of this large and handsome species extends from Virginia and southern Indiana south and southwest to Florida, Oklahoma and Texas. Its food habits are not recorded but, as both adults and nymphs in all stages live beneath loose bark, they probably feed on the various stages of insect

life which occur beneath the same cover. Say mentions it from Georgia and Florida, but not from Indiana, though I found it in numbers about New Harmony where he collected for several years. Brimley (1907, 437) found it not uncommon at Raleigh, N. Car., "under bark of dead pines in winter; both nymphs and adults being then found but the latter more abundantly." At Ormond and R. P. Park, Fla., I found only nymphs in March.

Subfamily VIII. **APIOMERINÆ** Amyot & Serville, 1843, 350.

Rather stout, medium sized oval species, having the head porrect, with hind portion short, broad, the ocelli set very wide apart on its sides; tylus slightly surpassing cheeks; antennæ inserted between the eyes; joint 2 of beak longer than 1 and 3 united; pronotum constricted in front of middle, its lobes convex, the front one the narrower and with a median impressed line terminating near base in a large fovea; scutellum short, broad, its apex rounded or subtruncate; elytra entire, reaching or slightly surpassing tip of abdomen; front and middle legs short, stout, thickly beset with stiff bristles, their tarsi very slender, retractile, folding back in slits on the upper side of the swollen apex of tibiæ. Genital plate of male suborbicular, convex, enclosed by the union of the last dorsal and ventral, its apex usually with a pair of slender style-like appendages. One genus is known and represented in our territory.

I. **APIOMERUS** Laporte, 1832, 82.

In this genus the front lobe of head is prolonged, with sides (cheeks) declivent and tylus forming a ridge along the crest; joint 1 of antennæ stout, but slightly surpassing tip of tylus, 2 and 4 subequal, each one-third shorter than 3; hind lobe of pronotum subpentagonal, its lateral angles rounded; connexivum widely exposed. The females have the ventral surface of abdomen thickly pilose with stiff erect hairs and the hind tibiæ compressed and sinuous before the apex, their apical third furnished with a brush of dense stiff hairs. They have the power of exuding a viscid fluid from these bristles which is supposed to aid them in holding their prey or perhaps, in part, to glue their eggs to a leaf or other support. In the males the ventral surface is but sparsely pilose and the tibial brush much shorter. Twenty or more species are known, mostly from Tropical America, two occurring in our territory.

KEY TO EASTERN SPECIES OF APIOMERUS.

- a.* Pronotum black, its margins narrowly edged with red, the hind one often pale; ventrals usually wholly black; corium blackish-brown, its base reddish; genital plate of male black; larger, 14—19 mm.

538. CRASSIPES.

- aa.* Pronotum with disk in part red; ventrals each with a distinct pale transverse median bar, their front and hind margins black; corium in great part reddish-brown; genital plate of male dull red; smaller, not over 13 mm.

539. SPISSIPES.

538 (764). *APIOMERUS CRASSIPES* (Fabricius), 1803, 273.

Rather broadly oval. Black; narrow margins of pronotum, basal half of costal margin of elytra and rather broad margin of connexivum, both above and beneath, red or reddish-yellow; coxæ dull red; hind margin of scutellum and two or three short cross nervures of corium usually dull yellow. Structural characters as under subfamily and generic headings. Length, 14—19 mm. (Fig. 140).



Fig. 140, X 3. (After Lugger).

Southern half of Indiana, frequent, June 6—July 11; swept from foliage of hazel and other shrubs along pathways, usually on high wooded slopes. One was taken with a soldier bug, *Podisus maculiventris* (Say), impaled on its beak and another with a green Cerambycid beetle, *Gaurotes cyanipennis* (Say). Dunedin, Fla., April 10; beaten from juniper. The known range of *A. crassipes* extends from Canada and Connecticut west to Minnesota, Colorado and California, and southwest to Florida, Texas and

Mexico. Listed from twelve different stations in Florida. Uhler (1884, 282) says that:

"It lays its eggs on the twigs and bark of pine trees. These hatch during early summer, and the young may then be seen roaming over the trees in the search of plant lice and young caterpillars, which they pierce and suck to death, often holding them out on the tip of the rostrum, while keeping them from getting away by holding them down with the fore feet. The adult insects may be found in the trees as early as March, and numbers may be beaten therefrom during the summer and autumn. This species inhabits most of the thinly distributed pine belts from lower Canada to southern Florida, and varies much in the width of the red markings of the thorax, wing covers and abdomen."

Van Duzee (1914a, 13) reports it as "common everywhere on flowers from May to October," in southern California. The *Reduvius linitaris* Say (I, 355) is a synonym.

539 (765). *APIOMERUS SPISSIPES* (Say), 1825, 328; I, 72; II, 250.

Form of *crassipes* but smaller. Head, disk of pronotum in part, and scutellum except hind margin, black; parts of the disk of pronotum, corium, narrow margin of connexivum, coxæ, femora, basal halves of tibiæ and genital plate of male, dull red; antennæ, membrane of elytra, connexivals in great part, tarsi and apical halves of tibiæ, fuscous-brown; narrow basal margin of pronotum and apex of scutellum dull yellow. Length, 13—15 mm.

Dunedin, Lake Wales, Sarasota, Ft. Myers and Key West, Fla., Jan. 28—April 27 (*W. S. B.*); listed from eight other stations in that State. Taken by sweeping low huckleberry and other shrubs; also while crawling or flying along roadsides. Its range is more southwestern than that of *crassipes*, extending from Florida to Arkansas, Texas, Arizona, Mexico and Costa Rica. Recorded also from Colorado. Say's types were from Arkansas, where he says it "occurred in some plenty." Morgan (1907, 51) states that nymphs kept in captivity in Texas and furnished a variety of insects, fed mainly upon Coleoptera and Diptera, and that one adult, when captured, inserted its beak in the end of his thumb. "The pain at first was not so great as that from the sting of a bee or wasp, but in a few moments it was much greater, continued unabated for over an hour and the spot was tender to the touch for two weeks." The red hue of the pronotum varies greatly in extent, sometimes covering three-fourths of its area.

Subfamily IX. *ZELINÆ* Fracker, 1913, 222, 237. (*Harpactorinæ* Am. & Serv.)

Elongate, usually slender bodied Heteroptera having the head porrect, its front lobe usually much shorter than hind one;⁶⁹ eyes small, not prominent; ocelli small, placed rather close together⁶⁹ near front margin of hind lobe of head; pronotum narrowed in front, its hind lobe often spinose; elytra usually entire; connexivum usually narrowly or not at all exposed;⁶⁹ front legs long and slender, their tibiæ not thickened, but feebly if at all raptorial; tarsal claws usually toothed or appendiculate. This subfamily is the largest of the Reduviidæ, more than 700

⁶⁹These characters do not hold good in *Rhynocoris* and *Pselliopus*, which are aberrant genera of the subfamily.

species being known, 40 or more of which occur in America north of Mexico. These are divided among 13 genera, 11 of which are represented in our territory.

KEY TO EASTERN GENERA OF ZELINÆ.

- a. Sides of mesosternum without a small tubercle in front near the hind angles of the prosternum (Tribe *Zelini*).
- b. Front femora as long as or longer than hind ones; joint 1 of beak much shorter than joint 2, usually shorter than front lobe of head. I. ZELUS, p. 568.
- bb. Front femora shorter than hind femora or, if subequal in length, joint 1 of beak as long as or longer than joint 2.
- c. Joint 1 of beak shorter than joint 2.
- d. Legs and antennæ not annulate with black and yellow rings; joint 4 of antennæ longer than 3; joint 1 of beak not longer than head in front of eyes. II. RHYNOCORIS, p. 572.
- dd. Legs and antennæ strikingly annulate with black and yellow rings; joint 3 of antennæ longer than 4; joint 1 of beak distinctly longer than head in front of eyes. III. PSELLIOPUS, p. 573.
- cc. Joint 1 of beak as long as or longer than joint 2.
- e. Disk of hind lobe of pronotum armed with four prominent spines.
- f. Apical angles of ends of ventrals 3—5 not prolonged; third joint of antennæ of male not enlarged and flattened; cheeks with a long erect acute spine behind the base of each antenna.
- g. Hind portion of head, as viewed from the side, gradually narrowed into a neck; spines of cheeks pale, their length less than half the interocular width; elytra wholly pale. IV. ROCCONOTA, p. 575.
- gg. Hind portion of head at its middle suddenly constricted into a neck; spines of cheeks black, nearly as long as interocular width; elytra in great part black. V. REPIPTA, p. 576.
- ff. Apical angles of ends of ventrals 3—5 prolonged backwards into distinct spines; male with basal half of third antennal much enlarged and flattened; cheeks with a short, acute erect spine. VI. ATRACHELUS, p. 577.
- ee. Disk of hind lobe of pronotum without spines or with very short ones.
- h. Apex of femora without spines; hind portion of head usually suddenly constricted into a neck some distance behind the eyes; body not linear; elytra often much abbreviated. VII. FITCHIA, p. 578.
- hh. Apex of femora armed each side with a short slender spine; hind portion of head gradually narrowed to base; body linear; elytra always entire. VIII. DOLDINA, p. 580.
- aa. Sides of mesosternum with a small tubercle or fold in front near hind angles of prosternum; joint 1 of beak longer than front portion of head (Tribe *Harpactorini*).

- i. Front femora but little if at all thickened, not spinous, but slightly granulated; pronotum produced backward over the scutellum and with a high median tuberculate ridge; form very robust.

IX. ARILUS, p. 581.

- ii. Front femora much thickened, armed with numerous spines and densely granulated; pronotum not prolonged over the scutellum and without a high median ridge; form slender.

- j. Front tibiæ unarmed; front femora without a subapical spine above.

X. ACHOLLA, p. 583.

- jj. Front tibiæ with long spines on the lower side; front femora armed above with a stout, preapical spine (fig. 145, a).

XI. SINEA, p. 584.

I. ZELUS Fabricius, 1803, 281.

A large genus of elongate, slender species having the head nearly as long as pronotum, subcylindrical; eyes small, not prominent; ocelli small, not elevated on a tubercle; antennæ very slender, inserted on the ends of their basal tubercles, joints 1 and 3 elongate, usually subequal, 2 usually shortest, about one-third the length of 3, 4 shorter than 3; pronotum about as wide at base as long, narrowed in front, its hind lobe often spinose; scutellum with an obtuse V-shaped ridge on basal half; elytra entire; abdomen with sides subparallel; front legs long and slender, their tibiæ beset with numerous fine stiff hairs. Genital plate of male scoop-shaped, the protruding claspers usually prominent. Other characters as in key.

More than 70 species of *Zelus* have been described, mostly from tropical America, many of them based on color characters alone. Ten have been recorded from North America, six of which are known from the eastern states. Our species, when first captured, usually have the front legs thickly covered with pollen grains, bits of petals, small seeds and other minute parts of plants; also adherent to the hairs between the front tibiæ and femora, numerous dead bodies of plant lice, rove beetles and other small insects, the juices of which have served them as food. It is probable, therefore, that they explore the heads of flowers with their fore legs in search of such prey and that the particles of the plants and insects become attached by a viscid secretion exuded by the hairs.

KEY TO EASTERN SPECIES OF ZELUS.

- a. Hind lobe and lateral angles of pronotum without spines. (Sub-genus *Zelus*).
- b. Femora, basal joints of antennæ, and elytra in great part, black; hind portion of head with two black stripes. 540. BILOBUS.

- bb.* Femora, antennæ and elytra pale; body more slender. 541. CERVICALIS.
- aa.* Hind lobe of pronotum armed with two or more spines.
- c.* Lateral angles of hind lobe of pronotum armed with a prominent outward projecting spine, the disk unarmed; front lobe of pronotum sulcate at middle, hind lobe finely rugose, not sulcate. (Subgenus *Diplocodus*). 542. EXSANGUIS.
- cc.* Both lateral angles and disk of hind lobe of pronotum armed with short tubercles or spines. (Subgenus *Pindus*).
- d.* Front lobe of pronotum piceous, hind one paler; femora dull yellow, their apical halves in part fuscous; dorsal ridges of hind lobe of pronotum distinct.
- e.* Femora with a single dark ring on apical half. 543. SOCIUS.
- ee.* Femora with two dark rings. 544. AUDAX.
- dd.* Both lobes of pronotum concolorous; femora olive-brown throughout; dorsal ridges of hind lobe of pronotum scarcely evident. 545. ANGUSTATUS.

540 (768). *ZELUS BILOBUS* Say, 1832, 12; I, 306.

Elongate, subparallel; robust for the genus. General color orange-yellow; joints 1 and 2 of antennæ, disk of hind lobe of pronotum, basal half of elytra except the extreme base, membrane, beak except basal joint and femora and tibiæ, black; joints 3 and 4 of antennæ and tarsi dark brown. Hind lobe of head rather strongly constricted behind its middle. Pronotum broader behind and less narrowed in front than in our other species; front lobe convex, sulcate at middle, its front angles nodulose; hind lobe subdepressed, its humeral angles obtusely rounded. Other characters as under generic heading. Length, 15—18 mm.

Frequent throughout Florida, November—April; at hand from nine stations, including Ormond and Key West and recorded from 20 others. Taken by sweeping herbs and low shrubs along roadsides and in open pine woods; also from beneath loose bark of dead oak, where it was hibernating in small colonies, and by beating bunches of Spanish moss. Its distribution is southern, ranging from North Carolina to Florida and Texas. While it is a striking and easily recognized species, nothing has been recorded regarding its habits.

541 (770). *ZELUS CERVICALIS* Stal, 1872, 90.

Elongate, very slender. Dull straw-yellow; sides of head, especially the hind lobe, with two fuscous stripes; basal lobe of pronotum, scutellum and clavus usually more or less tinged with fuscous; dorsal surface of abdomen in part red. Hind lobe of head with sides subparallel throughout. Pronotum gradually feebly narrowed from base to apex; front lobe impressed at middle of base, its front angles ending in small tubercles, disk of hind lobe with three wide shallow grooves; its humeral angles obtusely rounded, slightly nodulose. Length, 11—14 mm. (Fig. 141).

This is the most common Reduviid in Florida, having been taken by me at nearly all collecting stations and recorded from many others. At hand also from Agricultural College, Miss. (*Weed*). From November to April it occurs in Florida on weeds and low shrubs in old fields and along roadsides or on tall dead grasses along the margins of ponds; usually on some plant whose colors blend with its hues. The whole front part of the body, including head, legs and antennæ, are often almost concealed by the debris which it has accumulated in its foraging. Ranges from Virginia southwest to Florida, Texas, California and Mexico.

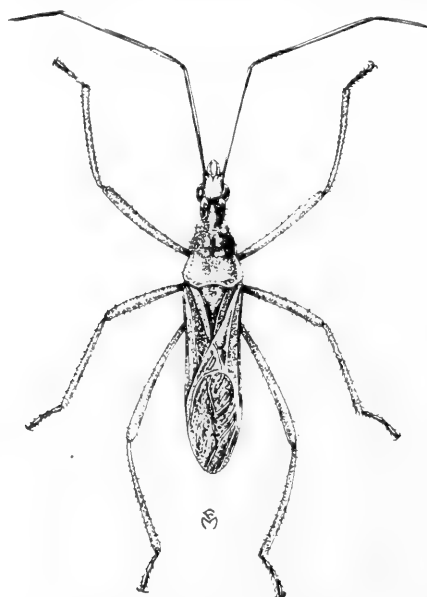


Fig. 141. X 3. (Original).

542 (771). *ZELUS EXSANGUIS* (Stal), 1862, 452.

Elongate, slender, subparallel. Greenish-yellow fading to dull straw-yellow; head, hind lobe of pronotum and scutellum sometimes fuscous or even black; spines of humeral angles usually in part or wholly black, membrane pale brown. Second antennal longer than in our other species, nearly half the length of first. Hind portion of head gradually tapering backwards. Pronotum as in key, its front angles nodulose; hind lobe subhexagonal, broader than usual. Length, 15—17 mm.

Frequent throughout Indiana, May 10—Dec. 11 (*H. S. B.*). Ashland, Mass., May 2 (*Frost*). Occurs in summer on low herbage in dense upland woods or on foliage of shrubs, especially the staghorn sumac, along woodland paths and roadsides; in fall on the ground beneath cover and possibly hibernates as imago. It is our most widely distributed *Zelus*, ranging from Quebec and New England west to the Pacific and south to Florida, Mexico and Panama. The only Florida record is that of Uhler (1878, 428) without definite station. It varies much in color and in the length of the spines of humeral angles, these sometimes mere tubercles. The males are more often black above than the females, and have the basal half of first anten-

nal somewhat thickened and genital segment ending in a short decurved spine. About Buffalo, N. Y., Van Duzee found it "not uncommon on small trees in May and June, reaching maturity about June 1st." The previous records in this country have been mostly under the name of *Diploda luridus* Stal, a synonym. The *Darbanus georgiae* and *D. palliatus* Provancher (1887, 181, 182) are placed by Van Duzee (1912, 324) as synonyms of *exsanguis*.

543 (774). ZELUS SOCIUS Uhler, 1872, 420.

Elongate, slender, subparallel. Fuscous-black or dull brownish-yellow; hind portion of head often with a narrow median line and a small spot behind each eye yellowish; hind lobe of pronotum paler than front one, the edge of its side and hind margins yellowish-white; apex of scutellum yellowish; elytra fuscous-brown, the main nervures and narrow costal margin often in part paler; femora dull yellow, the apical fourth fuscous, the two hues on front femora usually separated by a paler ring; under surface fuscous with a median pale line or stripe on abdomen and spots on sides reddish-brown, rarely wholly of that hue. Hind portion of head gradually and feebly narrowed. Pronotum subcampanulate, its front lobe with a rather wide median impression on its basal half; hind lobe with four low but rather acute carinæ, each terminating in a small erect conical tubercle. Length, 13—15 mm.

Miller, Lake Co., Ind., June 27—July 18 (*Gerhard*); beaten from pine. Lakehurst, N. J., July 30—Sept. 6 (*Davis*). Aberdeen and Southern Pines, N. Car., March—June (*Brimley*). Ranges from Quebec and New England west to Utah, Idaho and California and south to Florida, Texas and Arizona. Recorded from Crescent City and Allen River to Deep Lake, Fla., but these records probably refer to *angustatus* Hussey. Hart (1907, 237) states that in northwestern Illinois it is "common on *Rhus aromatica* in June and on *Mecodonia atriplicifolia* flowers in August."

544 (—). ZELUS AUDAX Banks, 1910a, 325.

General color dull brownish-yellow; vertex fuscous with a pale stripe each side; head behind eyes black, the median carina and sides yellow; front lobe of pronotum piceous-brown; membrane whitish-hyaline, the veins brownish; beak dark brown; legs dull yellow, coxæ fuscous, apical halves of femora with two brown rings; tarsi and tips of tibiæ fuscous. Antennæ dull yellow, the incisures fuscous; joint 1 as long as head and pronotum united, 2 and 4 subequal, each about one-third the length of 1, 3 one-third longer than 1. Head without antenniferous spines. Hind lobe of pronotum with rather wide median and lateral grooves, the ridges separating them ending behind in four distinct obtuse tubercles. Length, 13—14 mm.

Vienna, Va., July 24 (*Barber*). Falls Church, Va., July 24 (*Banks*). Ranges from Ontario and New England southwest to Virginia.

545 (—). *ZELUS ANGUSTATUS* Hussey, 1925, 66.

Elongate, subparallel. Brownish-yellow, more or less tinged with fuscous, sparsely clothed above, thickly beneath, with white scale-like hairs; veins of corium and margins of connexivum dull yellow; head and outer half of corium fuscous-brown; membrane whitish-hyaline, feebly iridescent, the veins dull yellow; legs brownish-yellow, thickly pilose. Antennal joints 1 and 2 and base of 3 brownish-yellow, remainder paler; joint 1 nearly three times as long as head, two and one-half times as long as 2, 3 nearly twice the length of 2, 4 two-thirds as long as 3. Head about as long as pronotum, hind lobe feebly and gradually narrowed from eyes to base, transverse interocular groove feebly impressed, median longitudinal carina very fine. Pronotum one-fourth longer than wide at base, hind lobe one-half longer than front one, its spines rather short and blunt. Length, 14 mm.

Gainesville, Fla., December; type male (*Hussey*). Recorded only from there. Allied to *Z. socius*, but readily distinguished by the characters given in key, by the covering of whitish tomentose scales, the more shallow transverse impressions of head and pronotum, and the longer first antennal.

II. *RHYNOCORIS* Hahn, 1834, 20.

Small elongate-oval species having the front lobe of head distinctly longer than hind one; basal joint of antennæ nearly twice the length of head, 2 and 4 subequal, 3 shortest; front lobe of pronotum very short with a large fovea at its base; apex of scutellum narrowly rounded; elytra slightly surpassing tip of abdomen; connexivum widely exposed, strongly recurved; legs with numerous stiff erect hairs. Two species occur in North America, one in our territory.

546 (777). *RHYNOCORIS VENTRALIS* (Say), 1832, 31; I, 355.

Elongate-oval. Head, antennæ, disk of hind lobe of pronotum, scutellum, sterna, sides of ventrals 1—4, and legs, except coxæ, black, shining; front lobe of pronotum in great part, margins of hind lobe, corium, coxæ and abdomen, dull red; clavus and membrane brown; connexivum red, the base of each segment black. Second joint of beak strongly compressed, as long as the others united. Length, 10.5—11.5 mm.

Mineral Springs, Ind., and Palos Park, Ill., June 25—July 5 (*Gerhard*). It is a member of the Transition Life Zone, its main distribution extending from New England west to Nebraska, British Columbia, Utah and California. Say recorded

it from "Missouri" when that name included most of the northwest. Taken in Colorado on alfalfa.

III. PSELLIOPUS Bergroth, 1905, 112.

Rather stout species of medium size having the front lobe of the head about as long as hind one exclusive of the neck; hind lobe subglobose, abruptly constricted about its middle; antennæ inserted above and in front of eyes, joints 1 and 3 subequal, each one-half longer than 2, 4 shortest, about one-half the length of 3; pronotum constricted in front of middle, its disk convex, front angles tuberculate, humeral angles armed with a short spine, hind margin in front of scutellum with a very wide notch or indentation; scutellum with apex more or less flattened and obtusely rounded; elytra reaching or slightly surpassing tip of abdomen; connexivum widely exposed, strongly reflexed. Male with last dorsal and ventral united to enclose the convex suborbicular genital plate, the apex of which is armed with an erect or oblique spine. About a dozen species are known, mostly from tropical America, three occurring in our territory. They have been mostly described or recorded under the name *Milyas* Stal, which was shown by Bergroth to be preoccupied.

KEY TO EASTERN SPECIES OF PSELLIOPUS.

- a. Disks of both front and hind lobes of pronotum smooth, unarmed; tibix annulate throughout their length.
- b. Basal margin of pronotum within the wide notch in front of scutellum bisinuate; short black spine of humeral angles of pronotum projected slightly beyond the angle and directed backwards; general color dull orange-yellow, more or less tinged with fuscous.
 - 547. CINCTUS.
 - bb. Basal margin of pronotum in front of scutellum truncate or straight across; short black spine of humeral angles not projected beyond the angle and directed outwards; general color a bright orange-yellow.
 - 548. BARBERI.
 - aa. Front lobe of pronotum setose and beset with 10—12 distinct obtuse tubercles; hind lobe with numerous small setose tubercles or granules; tibix annulate only toward base.
 - 549. LATIFASCIATUS.
- 547 (779). PSELLIOPUS CINCTUS (Fabricius), 1777, 302.

Oblong-ovate. Dull orange-yellow with a slight fuscous tinge; head, and often the front lobe of pronotum, in great part black; legs and joints 1 and 2 of antennæ dull white annulate with numerous black rings; joints 3 and 4 of antennæ pale brown; scutellum with basal half in large part black, apical half whitish; connexivum with an oblong or triangular

black spot behind each incisure; basal joint of beak with three black spots each side. Apex of genital plate of male with a short obtuse erect spine. Length, 12—13 mm. (Fig. 142).

Lawrence, Crawford and Perry counties, Ind., June 11—Sept.

24. Sanford and Dunedin, Fla., Jan.

2—April 3. Sherborn, Mass., Sept. 20

(Frost). Taken by sweeping herbage

along roadsides. This species is much

less common in Indiana than is *barberi*,

having been found only in the Lower

Austral Life Zone of the southern third

of the State. Its general range is ap-

parently more southern than that of

barberi, but on account of the long time

confusion of the two forms is difficult

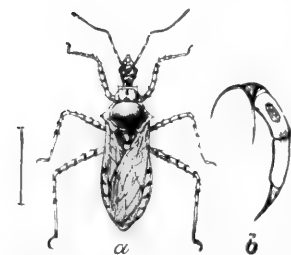


Fig. 142. X, 2, *a*, adult; *b*, beak.
(After Riley).

to state. Van Duzee gives it as New England west to Colorado and Wyoming and south to Florida, Oklahoma and Texas, but the more northern of the records upon which his distribution notes are based should undoubtedly in part be referred to *barberi*. It has been heretofore recorded in Florida only from Crescent City and Jacksonville. Uhler (1878, 427) states that "near the seacoast of New Jersey it is sometimes met with in great numbers on the small oak and hickory trees," and later (1884, 282) says that "the eggs are often glued to the bark of pine trees and covered by a waterproof gum which effectually excludes the rain, dries and hardens, and does not incommode the young when they push up the lid-like ends to make their way out." The amount of black on the front lobe of pronotum varies from a mere central dash in Indiana specimens to the covering of the greater part of the disk in some of those from Florida.

548 (780). *PSELLIOPUS BARBERI* Davis, 1912, 21.

Form of *cinctus*, but averaging slightly larger. Bright orange-yellow; head above black with a yellow spot on vertex; pronotum with only the tubercles on humeral angles and a small lunate spot on margin behind them black; black of scutellum confined to the area bounded by the V-shaped ridge of base, often wholly wanting; legs and antennæ annulate with black as in *cinctus*; connexivum with black spots as there. Apical half of scutellum less flattened, its tip more narrowly rounded, the disk with a well defined carina extending from the apex of the basal V to tip. Genital plate of male with apical spine longer, more acute and directed obliquely forward. Length, 12.5—14 mm.

Frequent in the southern half of Indiana, not taken north of Marion County, April 10—Oct. 11 (*W. S. B.*). Springfield, Mo., April 5 (*Davis*). Raleigh, N. Car., Oct. 29 (*Brimley*). In Indiana it is occasionally taken by sweeping herbage in dense woodland during the summer, but in April is often found mating and in small colonies in the crevices of the bark of living black-oak and elm trees, and in autumn is gregarious beneath cover along fence rows and in high open woodlands. The known range extends from Maryland and Virginia west to Kansas and southwest to North Carolina and Texas. A little experience will soon enable one to separate this form from *cinctus* by color alone, but the other characters given in the key and descriptions are stable and easily seen. Regarding the North Carolina specimens at hand *Brimley* wrote: "Mr. Sherman took over 100 under the bark of a dead pine near here on Oct. 29, 1900, and we have not seen one since."

549 (—). *PSELLIOPUS LATIFASCIATUS* Barber, 1924a, 211.

Oblong-ovate. General color dull yellow; tylus, a stripe behind each eye and two forming a Greek cross on vertex, shining black; corium and membrane fuscous-brown, a vague median spot on front lobe of pronotum and another on base of scutellum, blackish; connexivals yellow with narrow edge blackish, front half of each with an obclavate brownish spot; antennæ, femora and basal third of tibiæ annulate with shining black and dull yellow; ventrals 2—5 with a small round black spot each side. Joint 1 of antennæ twice as long as 3, 2 and 4 subequal, each slightly shorter than 3. Pronotum with tubercles and setæ as in key, its front and hind angles ending in short horizontal obtuse spines, those of the former directed outward, of the latter backward; hind margin within the notch in front of scutellum feebly bisinuate. Terminal genital of male entire, its apex ending in a short stout obtuse process. Length, 11—11.5 mm.

Plummer's Island, Md., July 27 (*Barber*). Known from Maryland, Virginia, Colorado, Louisiana and Texas.

IV. ROCCONOTA Stal, 1859b, 366.

Elongate-oval species of medium size having the transverse impression of head deep, front lobe almost as long as hind one and armed as in key, hind lobe rather strongly tapering from the eyes; ocelli large, well separated; pronotum subcampanulate, its front lobe sulcate at middle, hind one with three wide shallow grooves and armed with four prominent spines; scutellum small, with a V-shaped basal ridge, this enclosing a fovea, the apical spine short; elytra entire; connexivum narrowly ex-

posed; legs slender, subequal in length, the front femora slightly swollen; tibiæ beset with numerous fine erect hairs. Genital plate of male suborbicular, convex, its apex with a short slender erect spine. One of the six known species occurs with us, the others in tropical America.

550 (791). *ROCCONOTA ANNULICORNIS* (Stal), 1872, 77.

Elongate-oval, rather stout. Dull reddish- or straw-yellow, rather thickly clothed with a fine yellow pubescence; head tinged with fuscous; joint 1 of antennæ annulate with two broad brownish rings; 2 and 3 pale at base; spines of pronotum blackish at base, yellow above; femora with a vague brownish ring near apex and tibiæ usually with one near base; incisures of connexivum and a broad bar behind them dark brown. Joint 1 of antennæ as long as head and pronotum united, twice the length of 2, 3 nearly as long as 1, 4 shorter than 2. Pronotum with side margins feebly sinuate, disk of front lobe rugose. Abdomen in both sexes feebly widened behind the middle, the apical angle of first ventral prolonged as a short spine. Length, 16—20 mm.

Dunedin, Fla., April 7—11 (*H. S. B.*). Mobile, Ala., Aug. 27—Sept. 8 (*Gerhard*). Raleigh, N. Car., Aug. 25 (*Brimley*). Montgomery Co., Md., June (*Davis*). Not before known from Florida. The Dunedin specimens were beaten from foliage along the margins of a dense wet hammock. Stal's types were from Texas and Mexico and it has since been recorded in this country only from New Jersey.

V. *REPIPTA* Stal, 1859b, 366.

Rather small, elongate slender species differing from *Rocconota* only by the characters given in key, and in having the front lobe of head as long as hind one, the latter suddenly constricted about its middle; pronotum shorter, its front lobe less narrowed; front femora not swollen; apical angles of ventrals not prolonged. About 15 species are known, mostly from tropical America, three occurring in this country, one in our territory.

551 (786). *REPIPTA TAURUS* (Fabricius), 1803, 291.

Elongate, slender, subparallel. Orange-red or yellow; hind lobe of pronotum with four stripes and the spines black; corium and clavus black or fuscous, the costal margin pale; membrane fuscous-brown, translucent; joints 1 and 2 of antennæ and femora black; apical joints of antennæ, tibiæ and tarsi fuscous-brown. Spines of head and pronotum long and slender. Joint 3 of antennæ one-fourth longer than 1, 2 shortest, one-fourth the length of 3, 4 about twice as long as 2. Hind lobe of

pronotum subhexagonal, its lateral angles obtusely rounded. Males with third antennal slightly thickened for two-thirds its length and genital plate armed with a short erect tooth at apex. Length, 11—13 mm. (Fig. 143).

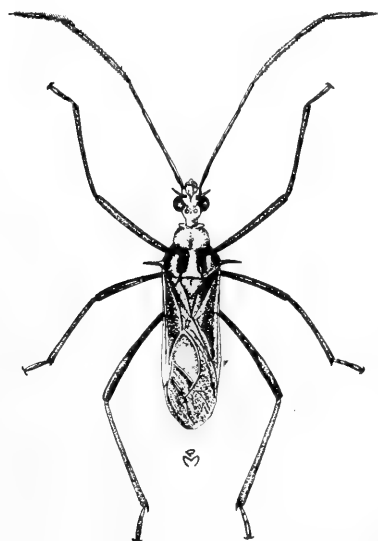


Fig. 143, X 2. (Original).

Sanford and Dunedin, Fla., Dec. 19—April 14. Frequent about Dunedin in early spring on low vegetation in moist grounds; hibernates beneath bark, in bunches of Spanish moss and beneath chunks along the margins of ponds. Recorded from eight additional Florida stations as far south as Lake Worth and Charlotte Harbor. Its known range extends from Pennsylvania and southern Illinois southwest to Florida, Texas, Mexico and Guatemala. Recorded also from southern Colorado.

VI. *ATRACHELUS* Amyot & Serville, 1843, 374.

Small elongate-oblong species, having the front lobe of head shorter than hind one, the latter gradually tapering from the eyes backward; pronotum short, not greatly narrowed in front, its disk with two obtuse ridges extending back from middle of front lobe nearly to base of hind one and ending in two rather stout suberect spines, the humeral angles each with a similar spine; scutellum small, with the usual basal V-shaped ridge, its apex obtuse; elytra reaching tip of abdomen; connexivum narrowly exposed; legs slender, the front femora unarmed, moderately swollen, a little shorter than hind ones. Genital plate of male oblong-oval, convex, its apex unarmed. Three species are known, one from Argentina, a second from Panama, the third occurring in our territory. Fracker in his key (1913, 224) has erroneously placed this genus under the section having the "pronotum unarmed on the disc."

552 (792). *ATRACHELUS CINEREUS* (Fabricius), 1796, 545.

Elongate-oblong, slender. Dull brownish-yellow, that of front lobe of pronotum darker; above except membrane thickly clothed with pros-

trate ash-gray pubescence; antennæ dull yellow, the basal joint in part darker; membrane fuscous-brown; connexivals each with an oblong blackish spot; legs fuscous-brown; meso- and metasterna fuscous; abdomen dull yellow, the sides usually with a blackish stripe. Male with thickened portion of third antennal blackish; abdomen with sides more parallel than in female. Length, 7—8 mm.

Ormond, Dunedin and Key West, Fla., Feb. 14—April 16. About Dunedin it occurs on foliage of oak and on tall grasses and other herbage along the margins of ponds. Recorded from numerous other stations in Florida. Ranges from Pennsylvania west to Michigan and southwest to Florida, Texas, Cuba, Mexico and Guatemala. It is one of the smallest of our Reduviids and is easily recognized by the prolonged apical angles of connexivum, unarmed front femora, small size and dull gray color.

VII. FITCHIA Stal, 1859b, 367.

Medium sized rather slender species having the front lobe of head slightly shorter than hind one, armed above near base of antennæ with two short erect tubercles; ocelli very small, widely separated; eyes of moderate size, not prominent; joint 1 of antennæ one-fourth longer than 3, 2 shortest, 4 one-half or more the length of 3; pronotum with transverse constriction feeble, its sides gradually converging from the base, front lobe with an ill-defined median groove, disk of hind one rugose, its humeral angles rounded, convex above; apex of scutellum ending in a short compressed upcurved spine; elytra usually strongly abbreviated, scarcely reaching second dorsal, when entire reaching tip of abdomen; connexivum strongly reflexed; abdomen of female much widened beyond base with sides broadly rounded, of male much less widened behind; front femora moderately swollen, about as long as hind ones, unarmed beneath, both they and tibiæ beset with numerous fine stiff erect hairs. Two species are known, both occurring in our territory.

KEY TO SPECIES OF FITCHIA.

- a. Hind lobe of pronotum without spines or tubercles; hind lobe of head gradually tapering from the eyes. 553. APTERA.
- aa. Hind lobe of pronotum with two very short spines or conical tubercles on disk and one above each humeral angle; hind lobe of head suddenly constricted behind its middle. 554. SPINOSULA.

553 (789). *FITCHIA APTERA* Stal, 1859b, 371.

Elongate, slender, wider behind middle. Dull straw-yellow; head, margins of front lobe of pronotum and scutellum tinged with fuscous; middle of dorsal surface of abdomen and middle and sides of ventral surface each with a rather wide fuscous-brown stripe. Joint 4 of antennæ one-half the length of 3. Disk of front lobe of pronotum with two broad obtuse ridges, these not extending back onto hind lobe. Other characters as under generic heading. Length, 12—14 mm.

Lake and Pulaski counties, Ind., April 10—May 12; one specimen from each. Taken from beneath boards in sandy upland fields (*W. S. B.*). Aberdeen, N. Car., April 14 (*Brimley*). Ashland, Mass., May 2 (*Frost*). A species of wide distribution but nowhere common, its range extending from Maine west to Utah and south and southwest to Oklahoma and Texas. In New Jersey and New York it occurs in summer on bushes or beneath boards in salt meadows and under hillside stones in spring. Gillette and Baker (1895, 59) reported it as "common near Ft. Collins, Colo., and in the adjoining foothills during winter, under stones and boards." Two of the five specimens at hand are brachypterous, and the winged one from North Carolina has the apical fifth of all femora piceous-brown. The past records have mostly been under the name *Fitchia nigro-vittata* Stal, a synonym.

554 (790). *FITCHIA SPINOSULA* Stal, 1872, 79.

Of the same form as *aptera* but averaging longer. Color much the same, the pronotum sometimes with a vague fuscous stripe each side extending back onto hind lobe and the dark stripes of under surface better defined; the dark median stripe of dorsum in the wingless form more prominent. Joint 4 of antennæ three-fourths the length of 3. Pronotum with ridges of front lobe extending back onto hind one, the disk of latter more strongly rugose, its two median tubercles widely separated and placed near the hind margin. Other characters as in key. Length, 13—16 mm.

Vigo Co., Ind., May 3. Dunedin and R. P. Park, Fla., Dec. 13—Feb. 15; sifted from bases of clumps of grass (*W. S. B.*). Recorded also from Newberry, Fla. Mobile, Ala., Jan. 7 (*Gerhard*). Southern Pines, N. Car., January (*Brimley*). Lakehurst, N. J., April 30 (*Davis*). Ranges from Long Island, N. Y., and Indiana south and west to Florida and Texas. Recorded also by Uhler (1876, 327) from Colorado, but that record is doubtful. Five of the eight specimens at hand are brachypterous. As Stal states it is: "*In omnibus partibus corporis non-nihil longiore*" than *aptera*, the legs and antennæ being notably so.

VIII. DOLDINA Stal, 1859b, 366.

Elongate, linear species having the front lobe of head only half the length of hind one; ocelli small, not elevated on a tubercle; joint 1 of beak slightly longer than 2; pronotum subcylindrical, the transverse constriction very feeble, its front lobe but slightly narrower than hind one, the front margin concave, humeral angles, in our species, each armed with a very short erect spine; scutellum elongate-triangular, its basal half with an obtuse V-shaped ridge; elytra reaching middle of last dorsal; connexivum not exposed; front femora feebly swollen, a little shorter than hind ones, the latter reaching base of sixth dorsal; front tibiæ with a short compressed preapical tooth; abdomen with apical angles of ventrals 1 and 2 slightly prolonged as a short spine. Genital plate of male scoop-shaped, its apex rounded.

Seven species have been described, three from Brazil by Stal, one from Antigua by Barber, one from Cuba by Fracker and Bruner and two from our territory by Bergroth. I can find no stable characters separating Bergroth's species and so place them both under one name.

555 (794). DOLDINA⁷⁰ INTERJUNGENS Bergroth, 1913a, 263.

Elongate, very slender. Dull straw-yellow, rather thickly clothed with a short, fine silky white pubescence; sides of head and scutellum usually tinged with fuscous; abdomen often fuscous, both above and beneath, its ventral surface with a pale margin, sometimes wholly pale; head and femora rarely suffused with reddish. Joint 1 of antennæ reaching apex of scutellum, 2 shortest, less than one-fourth the length of 1, 3 two-thirds the length of 1, twice as long as 4. Pronotum nearly twice as long as wide at base, its hind lobe finely and densely rugose-punctate and with three wide vague shallow grooves, the humeral angles each armed above with a short suberect tubercle or spine. Other characters as under generic heading. Length, 17—19 mm.

Dunedin, Sarasota and R. P. Park, Fla., Nov. 22—April 12. Frequent on tall dead grasses along the borders of ponds, lakes and the sloughs of the everglades. The spine of the humeral angles of pronotum varies in length from a mere tubercle to a very distinct acute projection. It is usually erect, but sometimes projects strongly outward. The abdomen varies much

⁷⁰Bergroth has shown (1913a, 263) that the generic names *Doldina* Stal and *Hygromystes* Stal are synonymous, the former having priority by a year. The subgenus *Ceballum*, proposed by Fracker and Bruner (1924, 172), is also, in my opinion, a synonym of *Doldina* and, judging from the description, their Cuban species *Hygromystes armata* is very doubtfully distinct from *D. interjungens* Berg.

in color from almost wholly piceous to entirely pale. Since the absence of humeral spine and the pale abdomen are the two main characters used by Bergroth in separating his *prætermissa* described from Florida from his *interjungens* from North Carolina, and since these characters are variable in all Florida specimens, I unite the two species under the latter name which has page priority. Its known range extends in the coast-wise states from Maryland to Florida. The types of *prætermissa* were from Charlotte Harbor, Fla., and British Honduras, and Barber has since recorded it from Ft. Myers, Everglade, St. Augustine and Georgiana, Fla.

IX. ARILUS Burmeister, 1835, 227.

Very large, stout-bodied species, having the front lobe of head only about half the length of hind one, armed with a short, stout curved spine in front of base of antennæ, hind lobe subcylindrical, but feebly narrowed backward; ocelli small, widely separated; pronotum with main transverse constriction at apical third, the front lobe constricted again near apex, its front angles bearing a large conical tubercle; hind lobe with center of disk compressed and elevated to form a high arched median crest, this armed above with eight or more short, obtuse, shining blackish tubercles; hind margin prolonged backward over scutellum, forked at apex, humeral angles subtruncate, armed behind with a backward projecting tooth; elytra narrow, reaching tip of abdomen; connexivum widely exposed, strongly reflexed; front femora moderately swollen, slightly shorter than hind ones, unarmed beneath; both they and tibiæ beset with short stiff erect hairs. Four species are known, all from tropical or subtropical America, one extending northward into our territory.

In the members of this and the following genera each side of the mesosternum is armed with a very small conical tubercle and the presence or absence of such a flimsy character is used by Stal and subsequent authors as the basis for separating the subfamily into two tribes, or, in other words, is the primary character of their key to genera. Stal admits (1874, 6) that "this tubercle, although usually more or less distinctly elevated, is nevertheless at times, when the pectus is densely sericeous, difficult to distinguish."

556 (796). *ARILUS CRISTATUS* (Linnæus), 1763, 16.

Elongate-oval, very robust. Color a nearly uniform dark fuscous-brown, everywhere except on membrane thickly clothed with short fine grayish pubescence; antennæ, beak, tibiæ and tarsi reddish-brown. Joints 1 and 3 of antennæ subequal in length, 2 and 4 also subequal, each about one-third the length of 3. Joint 1 of beak slightly longer than 2 and 3 united. Crest of pronotum with eight to twelve tubercles, the two or three in front usually bilobed; sides of pronotum behind the humeral angles not dilated. Margins of the abdomen distinctly sinuate. Length, 28—36 mm. (Fig. 144).

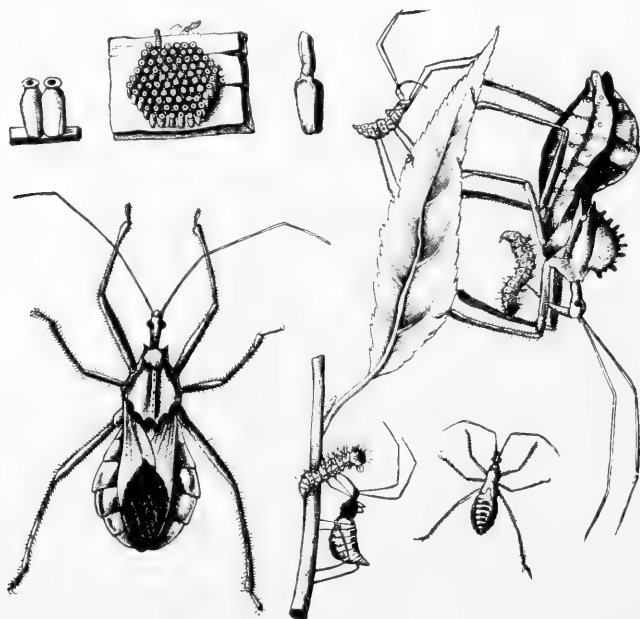


Fig. 144. Eggs, nymphs and adults, the latter life size. (After Riley).

Knox, Posey, Crawford and Jefferson counties, Ind., June 10—Oct. 27; Dunedin and R. P. Park, Fla., March 25—Dec. 12. The four Indiana specimens at hand were taken while resting on dead leaves, either on the ground or on shrubs along pathways in hillside woods. Two of those from Dunedin were taken at light; three were beaten from bunches of dead leaves, while the Park specimen was swept from roadside herbage. But two of the nine are males. This is the well-known “wheel-bug” of the southern states, so called on account of the peculiar semi-circular crest of the pronotum. Its known range extends from New York west to southern Illinois and southwest to Florida, Oklahoma, Texas, Mexico and Guatemala. Barber records it

from seven stations in Florida, including Jacksonville and Ft. Myers. The *Reduvius novenarius* Say (I, 71) is a synonym.

Uhler (1876, 327; 1884, 282) states that:

"In Maryland it dwells upon small pine trees and makes havoc with the caterpillars and other insects which come within its reach. Both sexes are formidable blood-sucking insects, able to conquer their neighbors of whatever order, and not at all backward in punishing man for sitting next their favorite trees. They glue their eggs to the bark of linden and other trees in our southern parks and gardens, extruding at the same time a gummy cement, which keeps the eggs in condition throughout all the bad weather of winter."

Seiss states (Ent. News, 1896, 58) that a captive specimen of *A. cristatus* was fed a red-legged grasshopper, *Melanoplus femur-rubrum*, which struggled violently when first seized, but almost instantly, after being pierced by the beak of the bug, its struggles ceased and in thirty seconds the grasshopper was dead. A "yellow-bear" caterpillar two inches in length lost all evidences of life and motion in thirty-five seconds after being seized by the bug.

X. ACHOLLA Stal, 1862, 445.

Slender-bodied Reduviids of medium size having the front lobe of head shorter than hind one and armed above with six to ten short, stout erect spines, hind lobe narrowed in front of middle to form a long subcylindrical neck; pronotum with a broad deep transverse constriction, the narrower front lobe with two small discal tubercles and several along each side margin, hind lobe densely rugose-granulate, its humeral angles subacute; scutellum with an obtuse basal V-shaped ridge, its apex rounded; elytra reaching tip of abdomen; connexivum narrowly exposed, strongly reflexed, its margin sinuate, male, broadly exposed and angulate at middle, female; front legs as in generic key, their femora subequal to hind ones in length, but much stouter. Genital plate of male suborbicular, convex, its apex armed with a short, stout spine. Three species are known, all from North America, one occurring in the eastern states.

557 (797). ACHOLLA MULTISPINOSA (De Geer), 1773, 348.

Elongate, widest behind the middle. Dull brownish-yellow or fuscous-brown, sparsely clothed with short grayish pubescence; legs and basal joints of antennæ vaguely annulate with brown and yellow; connexivum fuscous, its incisures pale. Joint 1 of beak subequal to 2. Antennæ inserted on front of head, joint 1 longest, 3 one-half the

length of 1, 2 and 4 subequal, each one-third shorter than 3. Front lobe of pronotum granulate, its disk with a deep groove on basal half. Length, 12—16 mm.

Frequent throughout Indiana, July 14—Oct. 27. In summer occurs on foliage of various shrubs and herbs along roadsides and pathways of open woods, both nymphs and adults being especially common on that of *Crataegus* and wild rye in August; in autumn on boles of trees or crawling along the bare ground in open places. Ranges from Ontario and New England west to Wisconsin and Colorado and south and southwest to Kansas and Arizona. Not recorded from the southern states. Van Duzee records it as occurring in numbers on oak near Buffalo, N. Y., and Hussey on hickory in Michigan.

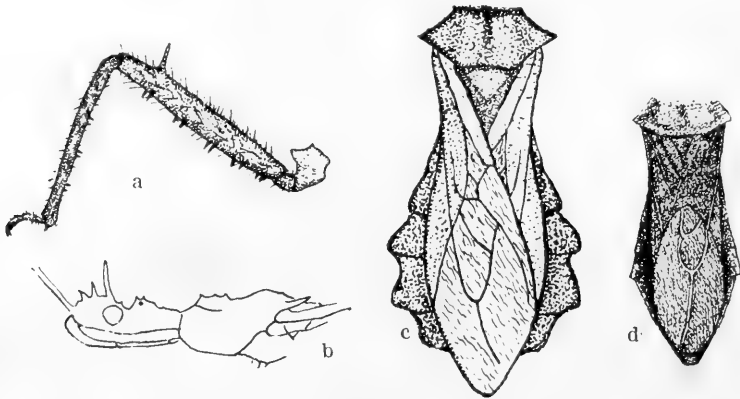


Fig. 145. *a*, front leg; *c*, hind portion of body of female of *Sinea diadema* (Fabr.); *b*, side view of head and pronotum of *S. sanguisuga* Stal; *d*, hind portion of body of same. (After Caudell).

XI. SINEA Amyot & Serville, 1843, 375.

Differs from *Acholla* mainly by the characters given in key, the front femora being armed above with a single long spine and both they and the tibiae beneath with two rows of shorter ones (fig. 145, *a*). The head is armed as there and the humeral angles of pronotum are usually more acute. About a dozen species are known, all from America, four of which occur in the eastern states. The genus has been monographed by Caudell (1901).

KEY TO EASTERN SPECIES OF SINEA.

- a*. Disk of front lobe of pronotum armed with spines; margins of abdomen prominently scalloped or undulate, female (fig. 145, *c*); entire or feebly undulate, male. 558. DIADEMA.

- aa.* Disk of front lobe of pronotum armed only with tubercles; margins of abdomen entire in both sexes (fig. 145, *d*).
- b.* Ventrals, especially the fourth, without pale spots; membrane without a dark median stripe on apical third; basal joint of antennæ with one or two pale rings; general color reddish-brown.
- c.* Segments of connexivum reddish-brown, the fourth and fifth not conspicuously darker; basal pair of antecular spines nearly or fully twice as long as the apical pair (fig. 145, *b*); smaller, length less than 12 mm. 559. SANGUISUGA.
- cc.* Fourth and basal halves of fifth and sixth connexivals distinctly darker than the others; basal pair of antecular spines not more than one-half longer than apical pair; larger, length 13 or more mm. 560. SPINIPES.
- bb.* Lateral margins of ventrals each with a broad pale spot; apical third of membrane usually pale with a dark median stripe; basal joint of antennæ not annulate with paler; general color darker than in the two preceding species. 561. RILEYI.

558 (800). SINEA DIADEMA (Fabricius), 1777, 302.

Elongate, subparallel, male; abdomen much wider behind, female. Reddish- to dark fuscous-brown, sparsely clothed with fine yellowish pubescence; hind lobe of head, front lobe of pronotum, scutellum and membrane usually darker than remainder of upper surface; connexivals dark brown with a pale spot in front of each incisure; antennæ pale brown, the first joint darker at base; femora fuscous, tibiæ and tarsi paler; abdomen dull yellow mottled with fuscous. Front lobes of both head and pronotum with numerous erect spines of unequal length; hind lobe of head with several small tubercles and spines. Hind lobe of pronotum densely rugosely punctate, its disk, especially in female, gibbous or with three wide shallow grooves separated by obtuse ridges, its hind margin fringed with short slender spines. Length, 12—14 mm. (Fig. 146).



Fig. 146, X 2.
(After Riley).

Common throughout Indiana, May 30—Oct. 9. Dunedin, Fla., Nov. 22. Evidently scarce in that State as but one has been taken by me and it is recorded by Barber only from Biscayne Bay. In Indiana it is our most common Reduviid, reaching maturity in early June and in July and August swept by scores from weeds and grasses along roadsides and fallow fields. In autumn it is frequent on flowers of Compositæ, especially thistle and asters, where it has been seen feeding on plant lice and other insect prey. Its known range includes Quebec, Ontario, British Columbia and practically the entire United States and Mexico. Ashmead (1895, 321) states that the eggs

are deposited in clusters of eight or more on the surface of leaves, and hatch in ten or twelve days. Uhler states that the adults rove about in fields and near woods, ascending golden-rod and other plants and seizing such insects as come within their range. Hussey (1922a) reports it as extremely abundant in August on dense growths of tall weeds everywhere in North Dakota, and again "as the most abundant Reduviid in Michigan, found in all grassy localities from late July till October."

559 (806). *SINEA SANGUISUGA* Stal, 1862, 444.

Elongate, slender. Dark reddish- to fuscous-brown; antennæ reddish-brown, the incisures pale, the basal joint with a pale ring in front of middle; femora and tibiæ sometimes annulate or spotted with pale. Spines of front lobe of head (fig. 145, *b*) gradually decreasing in length from the base. Pronotum with front lobe armed with a number of small tubercles and with a broad median impression beginning at its middle, widening behind and ending at middle of hind lobe; humeral angles obtusely triangular, projected somewhat backward; disk of hind lobe convex, coarsely reticulate-punctate, its hind margin with a fringe of small spines. Abdomen widened to apex of fourth segment, where it is obtusely angulate and dentiform (fig. 145, *d*), narrower in male than female. Margins of connexivals finely serrate. Length, 10–13 mm.

Ormond, Sanford, Moore Haven and Dunedin, Fla., scarce, Nov. 16—April 15. Occurs in late autumn on flowers of golden-rod; in spring on weeds along the margins of ponds and roadsides. Described from Mexico. Known in this country only from Texas and Florida. Barber does not include it in his Florida list, but Fracker mentions it from there without definite locality.

560 (807). *SINEA SPINIPES* (Herrich-Schaeffer), 1848, 82.

Elongate, more robust than either *sanguisuga* or *rileyi*. Dark reddish-brown or fuscous; antennæ reddish-brown, the basal joint with two pale rings; median carina and apex of scutellum dull yellow; corium with small scattered pale spots; connexivals 2, 3 and 6 each with a large pale spot, 4 and 5 both in great part or wholly blackish; middle and hind femora and tibiæ annulate with paler. Spines of front portion of head long and subequal. Pronotum with front lobe more convex than in *sanguisuga*, otherwise as there; hind lobe wider, also less convex, its reticulate punctures more shallow and spine or process of humeral angles smaller, projecting outward. Apex of scutellum broadly rounded or subtruncate. Margins of connexivum entire or minutely tuberculate. Abdomen in male less widened to apex of fourth segment, the latter less acute and without a backward projecting denticle as in *sanguisuga*. Length, 12–15 mm.

Frequent in the southern half of Indiana, April 25—Sept. 24,

not taken north of Marion County. Occurs on foliage of trees and shrubs along pathways and borders of woods. Dunedin and LaBelle, Fla., November—April. Hibernates in bunches of dead leaves and beneath rubbish and swept in spring from tall weeds in moist places. Recorded from numerous stations in that State. Its known range extends from Yaphank, N. Y., west to southern Illinois and Colorado and southwest to Florida and Texas. It is a close ally of *sanguisuga*, the females being easily distinguished by the subequal spines of head and dark fourth and fifth connexivals; the males are more difficult to separate, but the sides of connexivals are not serrate as in *sanguisuga* nor the apex of fourth connexival prolonged backward as there.

561 (808). SINEA RILEYI Montandon, 1893, 51.

Elongate, slender, subparallel. Dark chestnut- or fuscous-brown, rather thickly clothed with fine prostrate grayish pubescence; antennæ dull yellow, the first joint blackish at base; ventrals black, each with a large whitish spot on the outer apical angle; femora fuscous-brown, the tibiæ paler. Spines on front lobe of head shorter than in our other species. Pronotum with tubercles and grooves of front lobe as in *sanguisuga*; hind lobe with humeral angles ending in a short slender spine and hind margin with only one or two short spines each side of scutellum. Abdomen with side margins rounded and sometimes feebly undulate in female, subparallel, male. Length, 10—11 mm.

R. P. Park, Cape Sable and Dunedin, Fla., Nov. 22—April 5. Van Duzee (1909, 177) mentions it as "taken at nearly all stations where I collected in Florida." At Dunedin it occurs on huckleberry and other low shrubs in open pine woods; also in dense hammocks. Described from California. Ranges from North Carolina south and west to Florida, Utah, Texas and California. The darker color, shorter spines on head, non-annulate antennæ and pale apical half of membrane readily distinguish it from the two preceding species.

Family XX. NABIDÆ Costa, 1852, 66.

THE DAMSEL-BUGS.

Elongate-oval or oblong, rather slender species of medium size having the head stout, shorter than pronotum, its front portion prolonged in front of eyes and moderately declivent; ocelli rather large, approximate; beak 4-jointed, the first joint very short; antennæ 4-, rarely 5-jointed; pronotum subcampanulate or subconical, usually with a distinct collar; elytra

either entire and covering the abdomen or abbreviated and usually not reaching its middle, when entire with clavus and corium submembranous and membrane large and furnished with four long veins which near apex give rise to several short ones; front legs raptorial, the tibiæ armed with setæ or minute spines and in repose fitting closely against the swollen femora; tarsi 3-jointed, their claws terminal.

The family is of small size, only 21 species being known from America north of Mexico. They are predaceous in habits and occur for the most part on the foliage and flowers of herbs growing in dense woods or along the margins of ponds, lakes and streams. Here they wander about in search of plant lice and soft bodied larvæ and nymphs of other plant-feeding insects. They are therefore to be classed as beneficial, though their numbers are too few to be of great value. Our eastern species are distributed among two subfamilies. For literature pertaining to them see Stal, 1873; Reuter, 1873, 1873a, 1890, 1908; Champion, 1899; Parshley, 1920, 1923.

KEY TO EASTERN SUBFAMILIES OF NABIDÆ.

- a.* Antennæ 5-jointed, the second joint short; front lobe of pronotum with subapical constriction wanting or very close to front margin, the collar, therefore, very short; corium and clavus coriaceous, opaque, the latter not widened behind.

Subfamily I. PROSTEMMINÆ, p. 588.

- aa.* Antennæ 4-jointed, the second joint long; front lobe of pronotum with subapical constriction placed some distance behind front margin, the apical collar wide; corium and clavus submembranous and subtranslucent, the clavus widened opposite apex of scutellum.

Subfamily II. NABINÆ, p. 590.

Subfamily I. PROSTEMMINÆ Reuter, 1890, 289.

The members of this subfamily are so different in structure and facies from our other Nabidæ that they should be placed in a family by themselves. Our eastern species have the head immersed in thorax to eyes; antennæ distinctly 5-jointed, the second joint only about one-fifth the length of third; ocelli very small, placed close to the inner basal margin of the eyes; pronotum without a distinct collar, the postmedian constriction vague; elytra in great part coriaceous, commissure shorter than scutellum; front femora strongly swollen, shallowly grooved beneath, the inner margin of the groove beset with numerous short stout black setæ; front tibiæ with apical fourth

or more widened, compressed and furnished with numerous short setæ, thus forming with the femora a highly specialized raptorial organ. The subfamily is represented in this country by two genera, one occurring in the eastern states.

I. PAGASA Stal, 1862, 60.

Black or fuscous shining species having, in addition to characters given above, the eyes large, prominent, coarsely granulated; pronotum longer than broad with a fine straight transverse groove very close to its front margin; scutellum with two small median foveæ; embolium of elytra present; front and middle tibiæ with a spongy fossa at apex. Two of the eight known species occur in the eastern states.

KEY TO EASTERN SPECIES OF PAGASA.

- a. Beak reaching middle coxæ, joint 2 much longer than 3; clavus of elytra opaque; apical third of front tibiæ much widened on inner side. 562. PALLIPES.
- aa. Beak reaching front coxæ, joints 2 and 3 subequal in length; elytra shining throughout; front tibiæ angularly widened only on under side near apex. 563. FUSCA.

562 (815). PAGASA PALLIPES Stal, 1873, 108.

Elongate-oval. Black, shining; the head and pronotum with a few widely scattered erect hairs; scutellum, clavus and membrane dull sooty black; antennæ reddish-brown, the outer joints tinged with fuscous; legs and beak brownish-yellow. Antennæ 5-jointed, joint 2 very short, less than half the length of 1, 3—5 subequal, each more than twice the length of 1. Pronotum campanulate, its transverse constriction near base with a row of punctures, elsewhere smooth and very shining; sides in front of constriction rounded and feebly converging, elytra in macropterous forms reaching tip of abdomen, connexivum broadly exposed, female, narrowly so, male; in brachypterous form reaching onto third dorsal. Length, 5.5—7 mm.

Sanford, Lakeland, Cape Sable and Dunedin, Fla., Nov. 21—March 29. Occurs sparingly about Dunedin beneath bunches of weeds, on foliage of oak, etc. Recorded from Newberry, Jacksonville and Key Largo, that State. Known elsewhere from Michigan, Kansas, Texas, Utah and Panama. Uhler (1876, 325) says that it is commonly found in company with *Nabis subcoloptratus*, a species which it closely resembles in color and form.

563 (816). PAGASA FUSCA (Stein), 1857, 90.

Form and size of *pallipes*. Color much the same, the scutellum only of the upper surface opaque. Joint 2 of antennæ more than half the

length of 1, 3—5 subequal, shorter than in *pallipes*. Pronotum as there, its erect hairs more numerous. Elytra in macropterous form reaching tip of abdomen, the large membrane with three elongate cells; in brachypterous form only to second dorsal with membrane wholly absent, or to slightly beyond middle of abdomen, the membrane then very short. Front femora strongly swollen, armed beneath with numerous short setæ. Length, 5—7 mm. (Fig. 147).

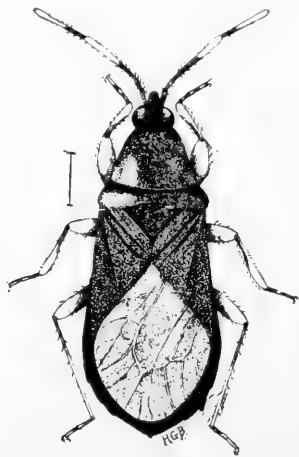


Fig. 147, X 6. (After Bruner).

Marion, Vigo and Orange counties, Ind., Sept. 9—Oct. 18. Taken while running over low sandy cultivated ground or beneath logs and stones. Of the five specimens at hand but one is fully macropterous, two have the elytra reaching middle of abdomen, the other only to second dorsal. Its known range in this country extends from New England west to British Columbia.

Champion records it from Mexico, Central America, Panama and Guatemala, but these records may be in error as it was originally described from Pennsylvania, and as *nitida* Stal, a synonym, from Wisconsin. There are no records in this country south of New Jersey. Except that it is found under logs and stones, nothing has been recorded of its habits.

Subfamily II. NABINÆ Reuter, 1890, 293.

Elongate or oblong-oval, slender bodied species having the head stout, subcylindrical, subporrect, the eyes placed near its middle, some distance in front of pronotum, and ocelli on middle of postocular portion; pronotum with two distinct transverse constrictions, the collar wide; antennæ 4-jointed; elytra, except veins, largely membranous, the commissure in macropterous forms much longer than scutellum; front femora rarely much swollen, the setæ of their under surface fine; front tibiæ but slightly wider near apex, their spongy fossa rudimentary. Two genera represent the subfamily in the eastern states.

KEY TO EASTERN GENERA OF SUBFAMILY NABINÆ.

- b. Ocelli separated by at least their own diameters; first joint of antennæ but little if at all longer than head; second joint of beak but little longer than third. I. NABIS, p. 591.

- bb.* Ocelli separated by less than their own diameters; first joint of antennæ more than twice the length of head; second joint of beak much longer than third. II. METATROPIPHORUS, p. 604.

I. NABIS Latreille, 1807, 127.

A large genus of elongate or oblong-oval, usually slender-bodied species having the pronotum campanulate with two fine transverse constrictions, its sides gradually converging from the posterior constriction to apex, humeral angles rounded, hind margin subtruncate; scutellum small, triangular, usually in great part black, with a calloused yellowish spot each side, its apex obtuse; clavus widened behind; elytra either entire and reaching or surpassing tip of abdomen, or abbreviated and usually reaching only second dorsal, when entire the membrane with three elongate cells, their terminal bounding vein with numerous short ones radiating to tip of membrane; connexivum in males of macropterous forms usually narrowly or not at all exposed, in females more broadly so; front femora spindle-shaped, moderately swollen, both they and tibiæ beset beneath with numerous fine setæ; front and middle tibiæ with a short spongy lobe at tip; tarsi 3-jointed. More than 40 species are known, 19 of which occur in this country, 17 of them from the eastern states. Most of our species have in the past been described or recorded under the generic name *Coriscus* Schrank.

KEY TO EASTERN SPECIES OF NABIS.

- a.* Body in great part shining black; sides of head behind eyes gradually converging obliquely backward. * 564. SUBCOLEOPTRATUS.
- aa.* Body wholly or in great part gray, grayish-yellow or pale brown; sides of head behind eyes parallel or nearly so.
- b.* Front or middle femora, usually both, armed beneath with several short black spines in addition to numerous setæ; connexivum usually with pale and dark spots.
- c.* Body short, broad, robust; front femora strongly swollen; abdomen beneath black; outer basal angle of each connexival with a large black spot. 565. CRASSIPES.
- cc.* Body elongate, narrow; front femora only moderately swollen; outer basal angles of connexivals with small dark spots or none.
- d.* Hind lobe of pronotum almost smooth; body not much constricted at base of abdomen; tibiæ with five or more dark rings.
- e.* Sides of pronotum straight and rather strongly divergent from apex to base; elytra, brachypterous form, obovate, the tips broadly rounded and membrane scarcely evident; abdomen beneath wholly fuscous. 566. NIGRIVENTRIS.

- cc. Sides of pronotum subparallel, more or less sinuate; elytra, brachypterous form, narrower, the membrane short but distinct; abdomen beneath dull yellow with three fuscous stripes. 567. SORDIDUS.
- dd. Hind lobe of pronotum finely but distinctly punctate or rugose; body very slender; tibiæ with but one or two dark rings.
- f. Body much constricted near base of abdomen; apical third of corium with two red lines; middle femora without slender spines. 568. CONSTRICTUS.
- ff. Body not constricted near middle; corium without red markings; middle femora armed beneath with four or five slender black seta-like spines. 569. SPINICRUS.
- bb. Front and middle femora armed beneath with setæ only; connexivum usually without spots.
- g. Femora all with a subapical dark ring; hind lobe of pronotum distinctly punctate; joint 1 of antennæ longer than head. 570. ANNULATUS.
- gg. Femora without a distinct subapical ring; hind lobe of pronotum smooth.
- h. Form elongate; brachypterous forms with elytra less than three times the length of scutellum; first antennal about as long as head.
- i. Elytra shining, without fuscous dots between the nervures, surpassing abdomen by one-half or more the length of membrane; front femora but little swollen; macropterous forms only known. 571. CAPSIFORMIS.
- ii. Elytra opaque, usually with numerous fuscous dots between the nervures, in macropterous forms surpassing abdomen by one-third or less the length of membrane; front femora distinctly swollen; macropterous forms rare.
- j. Form very narrow; head about five times longer than interocular width; elytra in brachypterous forms rounded at apex, their membrane wanting. 572. PROPINQUUS.
- jj. Form broader; head about three times longer than interocular width; elytra in brachypterous form with apex truncate, their membrane present. 573. LIMBATUS.
- hh. Form broader, more or less ovate; brachypterous forms with elytra four or more times the length of scutellum; first antennal generally shorter than head; macropterous forms common.
- k. Elytra in macropterous form without three brown dots, in brachypterous form much shorter than abdomen; dorsal surface of abdomen dark brown with a single or double median pale line, the margin of connexivum pale. 574. FLAVOMARGINATUS.
- kk. Elytra in macropterous form with three brown dots, one on disk of corium, two on the vein separating the membrane from corium; elytra in brachypterous form reaching tip of abdomen; dorsal surface of abdomen without median pale stripes.
- l. First antennal much longer than anteocular portion of head.

- m.* Color grayish-white; form narrow; dark markings on inner sides of front and middle femora forming vague cross-bars; tibiæ without spots.
- n.* Front femora extending beyond apex of head; elytra with numerous small fuscous dots between the nervures; length, 6.5—8.5 mm. 575. FERUS.
- nn.* Front femora not reaching apex of head; length, 6—6.5 mm. 576. BREVIS.
- mm.* Color pale brownish-yellow to reddish-brown; form broader; femora with conspicuous spots, sometimes with vague cross-bars on inner side.
- o.* Hind tibiæ dotted; color pale to dark brownish-yellow; membrane in brachypterous form with closed cells. 577. ROSEIPENNIS.
- oo.* Hind tibiæ without dots; color pale reddish-brown; membrane in brachypterous form without closed cells. 578. RUFUSCULUS.
- ll.* First antennal but slightly if at all longer than anteocular portion of head.
- p.* Dorsal surface of abdomen black; tibiæ with black dots. 579. INSCRIPTUS.
- pp.* Dorsal surface of abdomen with sides and apex broadly pale; tibiæ without black dots. 580. KALMII.
- 564 (818). NABIS SUBCOLEOPTRATUS (Kirby), 1837, 282.

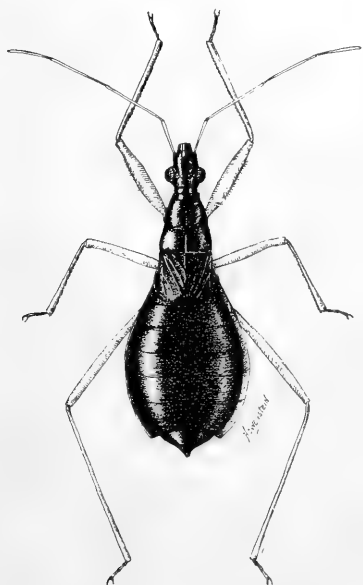


Fig. 147½. X 4. (After Lugger).

Oblong-oval, subdepressed, broader behind. Black, shining; the margin of connexivum, antennæ and legs pale brownish-yellow; hind lobe of pronotum and elytra of brachypterous form piceous. Pronotum with transverse constrictions very faint, the collar shorter than in our other species. Elytra in brachypterous form reaching middle of second dorsal, their tips rounded and membrane wanting. Front femora not spined beneath. Length, 9—10.5 mm. (Fig. 147½).

Fulton and Crawford counties, Ind., June 14—Aug. 3; taken from beneath stones and by sweeping herbage in moist grounds; probably occurs sparingly throughout the State. Its general range is northern, extending from Nova Scotia and New England west to Alberta, Colorado and Kansas. Not re-

corded south of New Jersey, except from Texas. Van Duzee (1894, 182) states that about Buffalo, N. Y., it is "common everywhere from July to September. The young in their earlier stages quite strongly resemble our common black ants and may be found in similar situations on goldenrod and other weeds and bushes. They reach maturity about July 1, but here rarely acquire wings." The long-winged form is everywhere scarce.

565 (821). NABIS CRASSIPES Reuter, 1873, 83.

Oblong-ovate, robust. Above dull clay-yellow; head between and behind the eyes, a median stripe and some lines on front lobe of pronotum and numerous spots on elytra, fuscous; scutellum black with a small yellow spot each side; connexivals each with a blackish spot, the one on sixth larger; pleura, meso- and metasterna and ventral surface of abdomen wholly or in great part fuscous-black; prosternum and apical lateral angle of each ventral dull yellow; femora and tibiæ with numerous dark brown spots, the inner side of front and middle femora with dark cross-bars; antennæ and tarsi dull brownish-yellow, the tarsal claws blackish. Basal joint of antennæ as long as anteocular part of head, 2 twice as long as 1, 3 one-fourth shorter than 2, nearly one-half longer than 4. Pronotum larger than in our other species, the transverse constrictions vague; sides feebly sinuate and slightly gradually converging toward apex which is about half the width of base. Elytra in macropterous form but little surpassing tip of abdomen, in brachypterous one reaching only to third dorsal with tips rounded and membrane obsolete. Front and middle femora swollen, the former very strongly so, hind ones slender. Length, 6—7 mm.

Dunedin, Fla., Feb. 6—15; one beneath a board, another swept from foliage in low ground. Borden Springs, Ala., Aug 15 (*W. S. B.*). Tepehuanes, Mexico (*Gerhard*). Described from that country and recorded elsewhere only from Georgia, Texas and California. The tibiæ are dotted or in part streaked with dark brown, not distinctly annulate as in *sordidus* or as shown in the figure of Champion (1899, pl. 18).

566 (819). NABIS NIGRIVENTRIS Stal, 1862, 458.

Brachypterous form—Oblong-ovate. General color fuscous-brown, thickly clothed with a short, fine silvery-gray pubescence; head and pronotum dull yellow, each with a vague fuscous median stripe; scutellum blackish with a yellow spot each side; elytra dull yellow, the main nervures often in part crimson; connexivum dull yellow, each segment with a median crimson spot, and outer basal angle with a minute fuscous one; front and middle femora barred within by fuscous; antennæ, beak and tibiæ dull yellow, the second antennal with an anteapical fuscous ring and tibiæ with four to six similar ones. Head shorter than pronotum. Joint 1 of antennæ one-third shorter than head. Pronotum nearly as wide at base as long, the base twice the width of apex, hind lobe sub-

depressed. Elytra as in key, reaching second ventral. *Macropterous form*—Elytra surpassing abdomen; membrane large, hyaline, with fuscous veins; apex of corium often with purplish lines. Length, 6.5—7 mm.

Dunedin, Fla., Dec. 1; one brachypterous male swept from low herbage in pine woods; another, Feb. 22, sifted from weed debris. A neotropical species described from Mexico and previously recorded in this country only from Colorado, Texas and New Mexico. Very similar to *crassipes*, but narrower, with front femora less swollen, dark spots of connexivals smaller and elytra with pinkish or purplish markings.

567 (820). NABIS SORDIDUS Reuter, 1873, 85.

Elongate-oval, the female broader behind. Above dull yellow mottled with numerous fuscous lines and blotches; head behind eyes, sides of front lobe of pronotum and some irregular lines on its disk, several short stripes on basal half of hind lobe, scutellum, except a spot each side, numerous small blotches on clavus and corium and membrane in great part, fuscous; a triangular spot each side of scutellum, basal third of costal margin of elytra, and a small pale calloused spot opposite base of membrane on corium, dull yellow; connexivals 1—5 with incisures fuscous, the basal half of 6 with a large fuscous spot; joints 1 and 2 of antennæ reddish-brown, 3 and 4 fuscous; femora with numerous brown spots, the middle and hind ones annulate near apex; tibiæ annulate with brown rings; under surface dull yellow, the sterna and three stripes on abdomen fuscous. Basal joint of antennæ about as long as head, 2—4 subequal, each one-fourth longer than 1. Elytra, macropterous form, slightly surpassing abdomen; brachypterous one reaching middle of second dorsal, their tips rounded and membrane very short. Connexivum of female broadly exposed, strongly reflexed; of male wholly concealed. Length, 6.5—8 mm.

Frequent throughout Indiana, more so in the southern portion; occurring throughout the year. Hibernates beneath logs, basal leaves of mullein and other cover along roadsides and borders of fields; in summer swept from low herbage in dense woods and especially from the great ragweed, *Ambrosia trifida* L., along the margins of ponds and streams. In my collecting I have found the brachypterous form more common than the long-winged one and the females much more common than the males. Its known range extends from Massachusetts west to Wisconsin and south and southwest to Florida, Texas, Panama and the West Indies. In Florida it has been recorded only from Newberry. Hussey reports it as "taken sparingly from undergrowth in the woods and from woodland grasses," in Berrien Co., Mich.

568 (—). NABIS CONSTRICTUS Champion, 1899, 303.

Elongate, slender, strongly constricted at middle. Dull straw-yellow; head, front lobe of pronotum, a spot on humeral angles, a vague transverse bar across the commissure of clavus, the tip of corium and the veins and basal half of membrane, fuscous or tinged with fuscous; nervures of apical half of corium and a spot on third connexival crimson; connexivals with a small dark spot on each apical angle; under surface with a narrow stripe along each side dark brown or fuscous; femora near apex and the tibiæ near base, each with a single brown ring. Eyes small, prominent, coarsely granulated. Antennæ very slender, as long as body, joints 2—4 subequal, 1 shorter, about as long as head. Elytra slightly surpassing abdomen; connexivum rather widely exposed, female, wholly concealed, male. Front and middle femora and tibiæ with a few small denticles in addition to the setæ. Length, 6.5—7 mm.

Lakeland, Fla., Feb. 22; two specimens beaten from bunches of Spanish moss near the margins of a lake. Described from Mexico, Guatemala and Panama and not before recorded from this country. The small eyes, finely rugose hind lobe of pronotum, spotted connexivals, constricted elytra and crimson nervures of apical half of corium distinguish it from *annulatus*, its nearest ally.

569 (824). NABIS SPINICRUS Reuter, 1890, 305.

Brachypterous form—Elongate, subparallel, very slender. Dull reddish-brown to brownish-yellow, minutely and thickly pubescent; flanks of front lobe of pronotum, five lines on hind lobe and a vague one on elytra and along middle of dorsum fuscous; under surface with sides of sterna and ventrals fuscous; legs dull yellow, front and middle femora faintly annulate with brown the ring near tips broader and more distinct; tibiæ with a brown ring near base and apex; apical joint of tarsus fuscous. Antennæ very slender, joints 1 and 2 dull yellow, 3 and 4 and apex of 2 fuscous-brown; 1 as long as head, 2 slightly longer and more slender than 1, 3 and 4 subequal, each about one-third longer than 2. Hind lobe and collar of pronotum minutely, rugosely punctate; elytra very short, barely twice the length of scutellum, their tips obliquely rounded and divaricate. Front femora with three or four widely separated short, pale spine-like setæ; middle femora with similar longer blackish, white-tipped ones arising from fuscous dots. Genital plate of male strongly convex at base, the apical half bent upward, broadly rounded. Length, 6.3—6.7 mm.

Dunedin, Fla., Nov. 27—April 17. Seven brachypterous specimens sifted from plant debris along the bay front and the border of a pond. A neotropical species, known from the West Indies and Mexico and recorded indefinitely by Van Duzee from the "Southern States." It is our most slender-bodied species and the only one with slender blackish spines on the under side

of middle femora. Macropterous forms are said to have the clavus, corium and membrane streaked with fuscous or brownish.

570 (823). *NABIS ANNULATUS* Reuter, 1873, 86.

Elongate, slender, subparallel. Dull straw-yellow; two narrow stripes on head, some vague irregular lines on front lobe of pronotum, five faint stripes on hind lobe, some elongate blotches on apical halves of clavus and corium, the nervures of membrane and incisures of connexivum, fuscous; extreme apex of corium blackish preceded usually by a reddish tinge; joints 1 and 2 of antennæ dull yellow, the former with two faint rings and the latter with apex darker, 4 and 5 tinged with fuscous; beak, legs and under surface pale yellow, the femora annulate near apex and the tibiæ near base with a single brownish ring; sides of sterna and basal half or more of abdomen with a brown stripe. Joint 1 of antennæ much longer than head, about one-fourth shorter than 2—5, which are subequal. Collar and hind lobe of pronotum densely and finely punctate. Disk of scutellum with two small foveæ. Connexivum very narrowly exposed, male; slightly more widely so, female. Length, 8—9.5 mm.

Marion and Putnam counties, Ind., April 15—Aug. 12. Swept from foliage of weeds and shrubs growing only in alluvial soil along the banks of streams. Ranges from Ontario and New England west to Illinois; not recorded south of New Jersey. Van Duzee (1894, 183) noted it as occurring in numbers on rank vegetation near Lancaster, N. Y. The annulate femora and tibiæ taken in connection with the densely punctured collar and hind lobe of pronotum readily separate it from our other species. In several of the specimens at hand there is a small crimson spot each side of scutellum and another on third connexival in addition to the vague one usually present in front of apex of corium.

571 (828). *NABIS CAPSIFORMIS* Germar, 1837, 132.

Elongate, slender. Pale straw-yellow, elytra shining without fuscous spots other than the usual three dots; head and front lobe of pronotum tinged with fuscous, the latter with a narrow median stripe and some irregular curved lines darker; membrane shining iridescent, its veins dusky; hind lobe of pronotum with traces of five dusky stripes; under surface pale dull yellow, the sides with a narrow brown stripe; middle of mesosternum and usually of abdomen with a dark stripe; antennæ and legs pale dull yellow, the front femora rarely with some small brown dots; tarsal claws blackish. Joint 1 of antennæ a little shorter than head, 2 and 3 subequal, each nearly one-half longer than 1, 4 shorter, half the length of 2. Elytra surpassing abdomen by one-half the length of membrane. Dorsum of abdomen pale tinged with reddish, male; fuscous, female. Length, 8—9.5 mm.

Dunedin and R. P. Park, Fla., Oct. 25—April 12 (*W. S. B.*). Terra Ceiga, N. Car., March 29 (*Brimley*). Frequent about Dunedin on tall dead grasses along the margins of ponds or along the bay front; also on foliage of button-wood on Hog Island. At R. P. Park it was sifted from weed debris and swept from tall grasses in the everglade marshes. This appears to be the only *Nabis* occurring in any numbers in Florida, having been recorded from eight stations. It is a cosmopolitan neotropical species ranging in this country from North Carolina southwest to Florida and Texas. Uhler (1894a, 205) records it as frequent in Grenada in August "upon open swampy spots on herbage." The long slender, shining, almost immaculate elytra, unspotted legs and relatively long and slender front femora are its principal distinguishing characters.

572 (825). *NABIS PROPINQUUS* Reuter, 1873, 87.

Elongate, slender, parallel. Dull straw-yellow, sparsely clothed with a fine whitish pubescence; head, pronotum and scutellum with a median dusky stripe; dorsum of abdomen dusky, paler at sides, with a darker median line bordered each side by one of yellow; under surface dull yellow with a broad fuscous stripe along each side; antennæ and legs pale dull yellow; femora dotted with purplish-brown, the front and middle ones with short brown bars on inner side. Head nearly as long as middle of pronotum. Antennæ slender, joint 1 as long as head, two-thirds the length of 2, 3 and 4 subequal, each three-fourths the length of 2. Beak reaching middle of mesosternum. Brachypterous form with pronotum subconical, its sides straight, feebly converging from base to apex, the latter two-thirds the width of base. Elytra reaching second dorsal, their membrane obsolete and tips obtusely rounded. Front and middle femora slender, subfusiform; hind ones longer, more slender, subcylindrical. Length, 10—14 mm.

Argo and West Pullman, Ill., July 24—Sept. 4 (*Gerhard*). Not taken, but doubtless to be found in northern Indiana as it is a species of the Transition Life Zone, ranging from Quebec and New England west to Illinois and Wisconsin. Hussey recorded it as moderately common on bulrushes and sedges in the marshes of southern Michigan. It is a very long, narrow bodied species and occurs only on sedges (*Carex*) and other semi-aquatic herbs. The long-winged form, *N. vicarius* Reut. (1873, 87) is said to be very rare. The *N. elongatus* Hart (1907, 262) is a synonym.

573 (826). *NABIS LIMBATUS* Dahlbom, 1850, 227.

Brachypterous form—Elongate, gradually feebly widened from head to fifth dorsal of abdomen. Above dull brownish-yellow, clothed with a

fine yellowish pubescence; a median stripe on head, some irregular marks on pronotum, a median line on scutellum and a wide stripe on middle of dorsum, fuscous-black; sides of dorsum often with a narrow crimson line; antennæ and legs dull reddish-yellow, the femora dotted with purplish-brown; under surface dull yellow, the sides of pleura and ventrals darker. Joint 1 of antennæ one-third longer than head, 2 longest, 3 two-thirds the length of 2, 4 one-half the length of 3. Pronotum subcylindrical, with collar relatively long, its basal constriction deep; hind lobe narrower and less elevated than usual. Elytra oboval, reaching second dorsal, their tips exclusive of membrane subtruncate, membrane very short. Length, 7.5—8.7 mm. (Fig. 148, a).

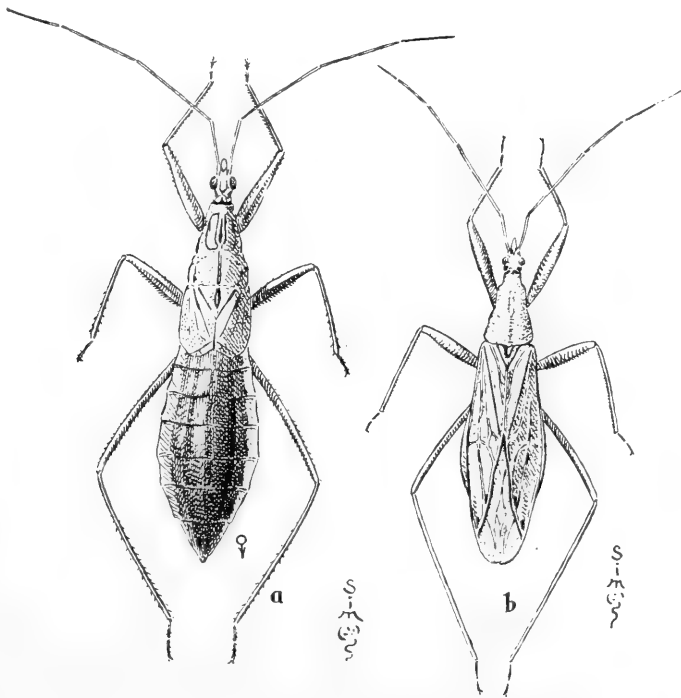


Fig. 148. a, *Nabis limbatus* Dahl.; b, *Nabis rufusculus* Reut., X 6.
(After Drake, Tech. Publ. No. 16, N. Y. St. Coll. For.).

Mt. Katahdin, Me., and Adirondack Mts., N. Y., August (Barber). A palearctic European species, ranging in the mountainous regions of this country from Quebec and New England west to Colorado. It occurs especially upon rank vegetation about the borders of tamarack bogs and marshes. Macropterous individuals are very scarce.

574 (827). *NABIS FLAVOMARGINATUS* Scholtz, 1846, 114.

Elongate-oval, much broader behind the middle. Dull straw-yellow, rather thickly clothed with short fine whitish appressed hairs; head with a median blackish stripe, this wider between the eyes; front lobe of pronotum with sides and a narrow median line fuscous; under surface brownish-yellow with a dusky stripe along the sides; antennæ and legs pale brownish-yellow, immaculate or with a few small brown dots; front and middle femora with some vague brownish cross-bars on inner side. Head one-third shorter than pronotum, its front declivent. Joint 1 of antennæ about two-thirds the length of head, 2 one-half longer than 1, 3 one-fourth shorter than 2, twice as long as 4. Beak slightly surpassing middle coxæ. Disk of pronotum, except collar, with a narrow median impressed line; sides feebly sinuate, base about two-thirds wider than apex. Elytra (brachypterous form) reaching third dorsal, their tips narrowly rounded or obtusely angled, the membrane very short. Other characters as in key. Length, 8—10 mm.

Golden, Colo., July 25 (*Gerhard*). The form described is var. *vanduzeei* Kirk., known only from Colorado and Washington. The typical long-winged *flavomarginatus* is palæarctic and occurs in Canada, Greenland and Maine.

575 (829). *NABIS FERUS* (Linnæus), 1758, 449.

Elongate, macropterous form; oblong and more robust, brachypterous one. Dull grayish-yellow, opaque; head and front lobe of pronotum with a median dark stripe, the latter also with irregular dark lines, the collar sometimes blackish; hind lobe of pronotum usually with five vague dusky stripes; elytra with numerous small fuscous dots between the nervures; membrane pale gray, the veins dusky; sides of under surface as far back as third ventral with a fuscous stripe; middle of mesosternum fuscous; antennæ reddish-brown, the terminal joints darker; legs dull yellow, the femora with but few small scattered brownish spots or none, their inner surface with transverse brownish bars. Joint 1 of antennæ shorter than head, 2 and 3 longer, subequal, 4 one-half the length of 3. Elytra surpassing abdomen by one-third the length of membrane, macropterous form; reaching its tip, the membrane very small or wanting, brachypterous one. Front femora moderately swollen. Length, 6.5—8.5 mm. (Fig. 149).

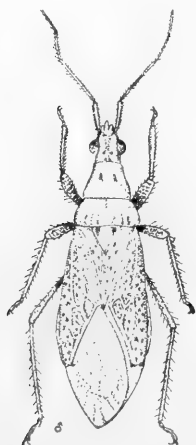


Fig. 149. Male, X 6.
(After Osborn).

Frequent throughout Indiana, more so in the northern portion. Hibernates as imago beneath dead leaves and other cover along roadsides and cultivated fields; in summer found on foliage of grasses and weeds in meadows and waste places. It is a palæarctic species which occurs throughout Canada and the northern United States. Recorded also

from North Carolina, Georgia, Texas, California, Mexico and Guatemala, but many of its southern records are doubtless erroneous, as the name has been a kind of "catch-all" for doubtful species. Uhler (1877, 428) states that it is:

"Widely distributed in Colorado as well in the mountains as on the plains and foot hills; chiefly, however, in spots where the agency of man is to be seen. Foreign weeds have been introduced and various plants have been encouraged by the wider distribution of seeds near the streams of water and on the routes of travel, and on these this species finds its home and food." Later he says: "It secretes itself in the blossoms of goldenrod or among the foliage of other low plants and lives by capturing small insects."

576 (—). NABIS BREVIS Scholtz, 1846, 113.

Brachypteros form—Elongate-oval. Dull clay-yellow; head with a short median stripe, widened in front, and a spot in front of and behind each eye, fuscous-black; front half of pronotum with a median fuscous stripe and some brownish reticulations; scutellum blackish at middle; elytra vaguely flecked with small dark points; membrane dull yellow, the veins brownish; mesosternum and a stripe along sides of under surface fuscous-brown; legs straw-yellow, front and middle femora with vague brownish bars on inner face. Joint 1 of antennæ one-third shorter than head, 2 nearly twice as long as 1, one-fourth longer than 3, 4 one-third shorter than 3. Pronotum one-fourth longer at middle than wide at base, its hind lobe smooth, subopaque, with two low obtuse ridges each side of middle, humeral angles nodulose above. Elytra visibly widened from the base, slightly passing tip of abdomen. Length, 6—6.5 mm.

Woking, England (*British Mus. Coll.*). Recorded by Parshley (1917, 67) as occurring at Cromwell, Conn., in December on nursery stock imported from England.

577 (830). NABIS ROSEIPENNIS Reuter, 1873, 89.

Elongate, slender. Dull grayish- to brownish-yellow, above usually thickly mottled with fuscous dots and lines; head with a median dark stripe and usually a blackish spot behind each eye; front lobe of pronotum with a narrow median stripe and irregular impressed lines fuscous, hind lobe with three vague dark stripes each side; scutellum with disk in great part black; elytra usually everywhere thickly mottled with small fuscous dots; membrane dull yellow, the veins dusky; connexivum pale yellow often tinged with crimson; joints 1 and 2 of antennæ pale reddish-brown, the apex of 2 darker, 3 and 4 fuscous-brown; femora thickly mottled with large reddish-brown dots; tibiæ with widely scattered smaller dots; under surface in great part fuscous-brown, the prosternum and middle of abdomen pale. Joint 1 of antennæ slightly shorter than head; 2 and 3 subequal, each twice the length of 1; 4 two-thirds the length of 3. Eyes large, prominent. Pronotum about as wide at base as long, its collar shorter than usual; hind lobe minutely punctate. Elytra surpassing abdomen by one-third the length of mem-

brane. Genital segment of male about twice as long as broad. Length, 6.5—8.5 mm. (Fig. 150).

Common throughout Indiana. Dunedin, Fla., Feb. 1 (H. S. B.). Henrietta and Lawrence, N. Car., April 24—Dec. 9

(Brimley). Sherborn, Mass., October (Frost). In Indiana it hibernates beneath piles of weeds, logs, basal leaves of mullein and other cover, especially in low damp localities. In summer it frequents for the most part tall grasses and weeds along streams and the margins of swamps, but is often taken in dense upland woods. It is probably the most common *Nabis* in the State, outranking both *ferus* and *sordidus*, which are next to it in numbers. But two specimens have been taken at Dunedin, both beneath the basal leaves of a thistle on Hog Island. Not before known from that State. Its known

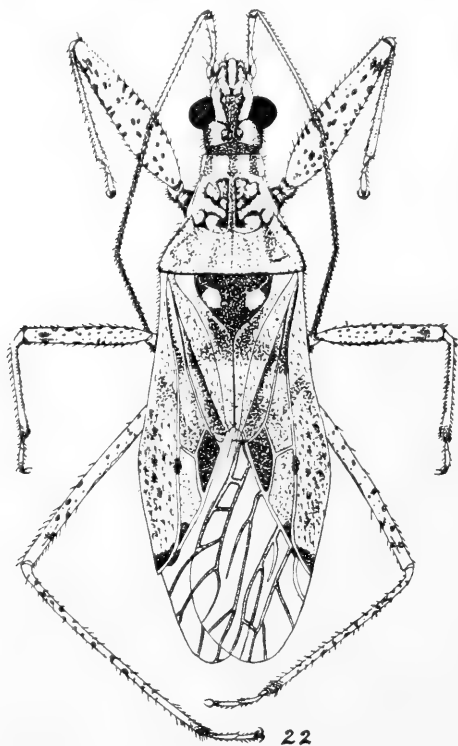


Fig. 150, X 11. (After Munding, Tech. Bull. 16, N. Y. St. Coll. For.).

range extends from Ontario and New England west to British Columbia and Colorado and southwest to New Jersey and Florida. The form described above is the one usually recorded as *N. punctipes* Reut., in which the dorsal surface of abdomen is fuscous-black. In the smaller and less common typical *rosicpennis* the surface of dorsum is almost wholly pale, and the elytra are less mottled with fuscous, in fresh specimens often having a pale roseate tinge. Both forms were described on the same page, the types of both being from Wisconsin, and Reuter, after the description of *rosicpennis*, which has priority, adds: "*An tantum variatio pallidior sequentis?*" Van Duzee mentions it as common about Buffalo, N. Y., May to September: "Occurring with

ferus but seeming to prefer damper and more weedy meadows." Drake (1923, 69) says that about Cranberry Lake, N. Y., *rosicipennis* "inhabits the deep woods, lumbered tracts and 'burns' but seems to prefer more or less open areas along trails and tote-roads. It feeds almost entirely upon grass- and herb-inhabiting insects."

578 (831). *NABIS RUFUSCULUS* Reuter, 1873, 92.

Elongate-oval. Pale reddish-brown, very finely pubescent, usually with a roseate or pinkish tinge; vertex and front portion of pronotum with the usual median stripe and other dark markings very faint or wanting; a spot behind eyes, another on middle of scutellum, some small dots on apical half of corium and a stripe along sides of pleura and ventrals fuscous; middle of mesosternum black; antennæ and legs pale reddish-brown, the femora with numerous small darker dots. Joint 1 of antennæ shorter than head, but longer than anteocular portion, 2—4 very slender, gradually decreasing in length. Pronotum subconical, about as long as head, sides slightly sinuate, feebly converging to apex, the latter three-fifths the width of base. Elytra (brachypterous form) reaching tip of abdomen, gradually widened from the base, their tips narrowly rounded and membrane very small. Front and middle femora subfusiform, but moderately swollen; hind ones longer, very slender. Genital plate of male oblong, its apex bluntly rounded and with a median slit or deeply impressed line reaching back to middle. Length, 6—7.5 mm. (Fig. 148, b).

Lake Co., Ind., June 7—29 (*W. S. B.*); Sept. 22 (*Gerhard*); brachypterous examples only. Swannanoa, N. Car., June 22—Oct. 5 (*Brimley*). Ashland and Sherborn, Mass., May 2—Oct. 15 (*Frost*). A species of northern distribution, ranging from Ontario and New England west to British Columbia, North Dakota and Colorado and southwest to North Carolina. The macropterous form is usually very scarce. Drake (1923, 70) records both long and short-winged forms as common about Cranberry Lake, N. Y., where it occurs in the somewhat open areas along the trails and tote-roads and on huckleberry bushes in bogs. The eggs were found in the stems of asters which were badly infested by aphids. He states that *N. rufuscus*, *limbatus*, *ferus* and *rosicipennis* are in that vicinity "pre-eminently wandering, grass- or herb- or very low shrub-inhabiting species and prey upon the insects found on these plants. They are rarely taken, and perhaps never breed, upon tall shrubs or trees."

579 (832). *NABIS INSCRIPTUS* (Kirby), 1837, 280.

Elongate, widest at middle of elytra. Dull grayish-yellow, head and front lobe of pronotum strongly tinged with fuscous; spot behind eye,

stripe on median lobe of pronotum, scutellum in great part, numerous scattered dots on elytra and middle of all sterna, a darker fuscous; collar of pronotum with three, hind lobe with five, vague brownish stripes; legs dull yellow, femora mottled with brown dots, the inner face of swollen front ones with brownish cross-bars; tibiæ with a few vague brownish marks; ventrals dull yellow, with median and lateral stripes fuscous-brown. Joint 1 of antennæ reddish-brown with vague fuscous markings, but little longer than head in front of eyes; 2 dull yellow, its apical sixth fuscous, one-half longer than 1; 3 and 4 pale fuscous, 3 slightly shorter than 2, 4 two-thirds as long as 3. Pronotum slightly longer at middle than wide at base, transverse constrictions well marked, median portion convex. Elytra, macropterous form, slightly passing tip of abdomen, the usual three brown spots of allied species vague or wanting. "Copulatory hooks of male with large semicircular short-pointed blade and short stem." (*Reuter*). Length, 7—8.5 mm.

Lancaster, N. Y., August (*Van Duzee*). A species of northern distribution, its range extending from Ontario and New England west to British Columbia. Except in the longer first antennal the description of *N. alternatus* Parshley (1922, 12) agrees very closely with *inscriptus*.

580 (833). NABIS KALMII *Reuter*, 1873, 91.

Elongate-oblong. Color above a nearly uniform grayish-white; head and front lobe of pronotum with a blackish median stripe, the latter also with fuscous impressed lines; hind lobe without the usual dark stripes; elytra with the ordinary three dark spots on the nervures, but with few if any fuscous dots on the intervals; membrane pale, the nervures dusky; under surface with a percurrent narrow fuscous-brown stripe each side, the middle of mesosternum and a narrow median stripe on abdomen fuscous; antennæ and legs brownish-yellow, the femora with scattered very small reddish-brown dots; tips and claws of tarsi blackish. First joint of antennæ distinctly shorter than head in front of ocelli. Pronotum about as wide at base as long. Genital segment of male three times as long as wide. Length, 6.5—7 mm.

Marion Co., Ind., July 22—Oct. 14; swept from rank weeds along the borders of streams. Known heretofore only from Wisconsin, Missouri, Nebraska and Colorado. "Rather similar to *N. ferus* L., but the color more inclined toward a pale yellow, the apex of dorsum widely testaceous and the intervals of elytra devoid of fuscous punctures" (*Reuter*).

II. METATROPIPHORUS *Reuter*, 1873, 93.

Elongate, narrow finely pubescent species having the head behind eyes constricted to form a long cylindrical neck; vertex with two fine median grooves; beak reaching front coxæ; pro-

notum about as wide at base as long, strongly constricted behind middle, its front lobe with a narrow median carina, and side margins distinct; elytra surpassing tip of abdomen, their membrane large without closed discal cells; front femora feebly swollen, armed beneath with a number of short distant spines; front tibiæ setose beneath, their tips obliquely truncate. One species is known from the West Indies and eastern states.

581 (834). *METATROPIPHORUS BELFRAGII* Reuter, 1873, 94.

Elongate, very slender, subparallel. Fuscous-brown, thickly clothed with very short silvery-gray pubescence; hind lobe of pronotum, and elytra in great part, dull reddish-brown, the latter with a fuscous cross-bar just behind the commissure of clavus; an elongate spot on clavus and two on embolium of elytra, pale dull yellow; membrane dusky, paler near tip, its nervures brown; antennæ and legs reddish-brown, apical fourth or more of femora piceous, tarsi and apex of tibiæ blackish. Eyes very large, coarsely granulated. Front lobe of pronotum with disk uneven, sparsely punctate, the side margins sinuate and subcarinate; hind lobe with a shallow median groove and a wide shallow impression each side, its hind margin squarely truncate. Commissure of clavus more than twice the length of scutellum. Other characters as before given. Length, 6.5—7 mm.

Yaphank, Long Island, N. Y., July 25 (*Davis*). Ranges from Massachusetts and New York west to Illinois and southwest to Florida, Texas and the West Indies; apparently scarce wherever found. The only Florida records are those of Barber from Clearwater and Bueno from Biscayne. Van Duzee swept one specimen from grass and weeds near Kingston, Jamaica.

Family XXI. *NÆOGEIDÆ* Kirkaldy, 1902, 168.
(*Hebridæ* Am. & Serv.).

THE VELVET WATER-BUGS.

Very small, oblong or subquadrate semi-aquatic or hygrophilous bugs having the surface of the body densely clothed with a very short velvety pile; head shorter than pronotum, subdeclivent; eyes large, coarsely granulated; ocelli present; antennæ 4- or 5-jointed; beak slender, 4-jointed, usually reaching between or beyond hind coxæ; pronotum as broad as or broader than abdomen, constricted in front of middle; scutellum small, triangular, its apex obtuse; elytra usually entire, the clavus membranous and membrane very large, without veins (fig. 6, *a*); connexivum narrowly exposed; legs short, subequal in length; tarsi 2-jointed, their claws terminal.

Fewer than 20 species are known from all parts of the world. They live in or near still or stagnant waters and their habits have been well set forth by Drake (1917, 102) as follows:

"Their favorite haunts are secluded coves of lakes, ponds, and swampy pools, where the water is shallow and where there is an abundant growth of aquatic plants. I have rarely seen them on the damp ground near the water's edge. They are aquatic pedestrians, capable of standing, walking and running upon the surface of the water, their entire body being covered with a velvety pile which effectively sheds the water and prevents them from becoming wet. They can move forward or backward, but the usual mode of progression is a steady forward movement, all three pairs of legs being used in locomotion. I have often found them on *Lemna*, *Nymphæa*, and various other aquatic plants. It is not uncommon to find them on the under side of floating leaves, or even among the roots of floating water plants. When submerged in the water, the insects are surrounded by a film of air which enables them to stay beneath the surface film for a considerable period of time. In an aquarium I have often watched them standing or walking for a period of a half hour or a little longer on pieces of cork or plants that were beneath the water. Occasionally, they would walk down the sides of the glass aquarium beneath the surface of the water and when the water was shallow, they would walk across the bottom and come up on the opposite side. Nothing seems to be known of their food habits and life history."

Our seven known eastern species are divided among two genera, the principal literature pertaining to them being by Uhler, 1894a, Champion, 1898; Drake, 1917; Bueno, 1912c, 1923, and Hungerford, 1920.

KEY TO EASTERN GENERA OF NÆOGEIDÆ.

- a.* Antennæ 5-jointed (not counting the minute joint at base of third), joints 3—5 very slender (fig. 6, *j*). I. NÆOGEUS, p. 606.
- aa.* Antennæ 4-jointed, the joints subequal in thickness, or the fourth stouter. II. MERRAGATA, p. 610.

I. NÆOGEUS Laporte, 1832, 34.

Very small, oblong stout bodied species possessing the characters set forth under the family heading and generic key. About a dozen species have been described, four of which occur in the eastern states. They have been mostly described or recorded under the generic name *Hebrus* Curtis (1833), but Laporte's name has priority by a year. As there has been much confusion of our eastern species I secured paratypes of two of Uhler's species from the British Museum and from them and others on hand drew up the following key:

KEY TO EASTERN SPECIES OF NÆOGUS.

- a.* Apex of scutellum obtusely angled, not or very feebly notched or bifid.
- b.* Antennæ slender, uniform pale brownish-yellow, joint 3 longer than either 4 or 5; elytra with a vague whitish spot on base of clavus and a distinct whitish line near outer margin of basal half of corium; membrane with three vague whitish spots or none. 582. *CONCINNUS*.
- bb.* Antennæ stouter, joint 1 yellow, 2—5 darker, 3 and 5 subequal, 4 shorter; elytra with a large white wedge-shaped spot on clavus, and a short vague yellowish line near outer margin of basal third of corium (fig. 151, *b*); membrane with four usually distinct white spots. 583. *CONSOLIDUS*.
- aa.* Apex of scutellum subtruncate, distinctly notched or bifid (fig. 152); membrane with four rather distinct pale spots; joints 2—5 of antennæ darker than 1, the latter one-half longer than 2.
- c.* Elytra with a narrow white line on outer margin of clavus and a similar slightly longer one near outer margin of basal third of corium (fig. 151, *a*); joints 1, 3 and 5 of antennæ subequal, 4 much shorter. 584. *BILINEATUS*.
- cc.* Elytra with white markings on clavus and corium as in *concinus*; joint 3 of antennæ longer than either 4 or 5. 585. *BURMEISTERI*.

582 (812). *NÆOGUS CONCINNUS* (Uhler), 1894a, 221.

Oblong, robust, minutely pubescent. Reddish- to fuscous-brown; head, basal lobe of pronotum, scutellum and apical third of corium, usually darker than remainder of upper surface; under side of head, bucculæ, beak and femora pale yellow, knees and tarsi lightly tinged with fuscous; clavus in macropterous form with a vague milky-white spot covering its basal half or less, exterior to this a longer narrow pale line on corium; membrane pale fuscous-brown with a vague yellowish spot each side at base and sometimes three faint whitish ones on disk, viz., an elongate one along the middle and a short oblique one each side of this, these usually very faint or wanting. Joint 1 of antennæ feebly curved, about one-half longer than 2, 3—5 very slender, thinly beset with fine erect hairs, 3 longer than either 4 or 5, which are subequal. Pronotum with disk uneven, coarsely, sparsely irregularly punctate and with an ill defined longitudinal median impression, its side margins distinctly not deeply notched between the two lobes, humeral angles swollen, obtuse. Elytra in macropterous form reaching tip of abdomen, in brachypterous one without white markings and reaching only to its middle. Length, 2—2.3 mm.

Frequent in the southern half of Indiana, April—November; Lake County only in the northern portion; doubtless occurs throughout the State. Dunedin and R. P. Park, Fla., Dec. 3—April 17. Previously recorded only from Biscayne Bay in that state. Geronimo, Guatemala (*British Mus. Coll.*). Occurs in muck, masses of water weeds and beneath boards near ponds;

also occasionally noted gliding over the surface of pond waters or crawling over the mud flats adjacent thereto. Ranges from Quebec and New England west to Illinois, Colorado and Washington and south to Florida, Guatemala and Grenada. Uhler records it as being taken at "Grenada at the roots of grass on muddy ground near pools of water," and states that "in Maryland the unwinged individuals may be found skimming over the surface of quiet water from spring until the end of summer." The white spots of membrane vary much in distinctness. But two of the 20 specimens at hand are brachypterous.

583 (813). NÆOGEUS CONSOLIDUS (Uhler), 1894a, 222.

Smaller and more oval than *concinus*. Pale to reddish-brown, finely pubescent, when fresh covered with a whitish bloom; beak, bucculæ and legs pale brownish-yellow, the knees and tarsi often darker; clavus and

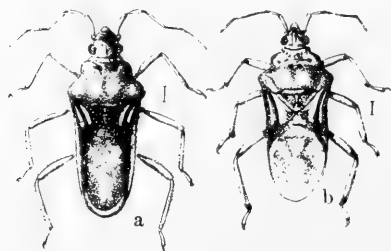


Fig. 151. a, *Næogeus bilineatus* (Champ.); b, *N. consolidus* (Uhl.) X 12. (After Champion).

corium with pale markings as in key; membrane with four white marks, the one at middle of base in the form of an oblong curved spot, this followed near apex by a longer, narrower one, and opposite the interval between these on each side an angular or curved line. Joint 1 of antennæ one-third longer than 2; 3—5 fuscous-brown, 3 and 5 subequal, 4 shorter. Beak reaching second ventral. Pronotum with disk of hind portion

more convex and less uneven than in *concinus*, constriction of side margins more shallow, punctures much finer, humeral angles more rounded, less outwardly projecting. Length, 1.8—2 mm. (Fig. 151, b).

Dunedin, Ft. Myers and Marco, Fla., Dec. 3—April 21. Mount Gay est., Grenada, W. I. (*British Mus. Coll.*). About Dunedin it is often taken by sweeping low herbage along margins of ponds and sometimes with *Notomicrus nanulus* (Lec), *Bidessus exiguus* (Aube) and other small water beetles on the under side of partly immersed boards. Described from Grenada and known from Kansas, Panama and Guatemala. Its only previous Florida record is that of Barber from Lake Worth.

584 (—). NÆOGEUS BILINEATUS (Champion), 1898, 119.

Oblong, subparallel. Dark reddish-brown; head, propleuræ, scutellum and apical third of corium blackish; elytra with two narrow pearly white lines as in key; membrane with four vague pale spots as in *consolidus*, bucculæ, beak and femora pale yellow, tibiæ and tarsi tinged

with fuscous; under surface piceous, shining, thickly covered with a minute grayish pubescence. Antennæ shorter than in any of our other species, joint 1 dull yellow, 2—5 dark brown, 1, 3 and 5 subequal in length, 2 and 4 much shorter. Pronotum narrower with sides more constricted at middle than in *consolidus*; disk with a more distinct median groove and punctures scarcely evident. Beak reaching first ventral. Length, 1.8—2.1 mm. (Fig. 151, *a*).

Miami, R. P. Park, Bassenger, Sarasota, Ft. Myers and Dunedin, Fla., Nov. 23—April 16. Occurs beneath boards and other cover about the margins of ponds and ditches, often in company with *consolidus*. Common at Ft. Myers in the muck of an extinct wet weather pond. It is a darker, narrower, more parallel-sided species than any of our others, with white markings of clavus and corium and short second antennal distinctive. Originally described from Chapultepec, Mexico, and not before recorded from this country. Champion's figure does not agree with his description, as it shows but three pale spots on membrane. The relative lengths of antennal joints in the figure

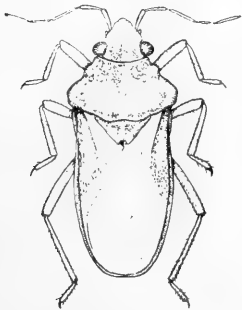


Fig. 152. Female. X 17. (After Hungerford).

also differ somewhat from his description and from those of the Florida specimens. His unique type is in the Vienna Museum. All of the numerous specimens at hand of both this species and *consolidus* are macropterous.

585 (810). *NÆOGEUS BURMEISTERI* Lethierry & Severin, 1896, 51.

Oblong, elytra subparallel. Head, except tylus, pronotum, scutellum and apex of corium dark fuscous-brown; tylus and coriaceous part of basal two-thirds of corium dull brownish-yellow; bucculæ, beak, first antennal and legs straw-yellow; knees, tibiæ and tarsi tinged with fuscous; pale markings of clavus and corium much as in *concinus*, the submarginal line on corium less distinct; markings of membrane as in *consolidus*. Antennæ distinctly shorter and stouter than in *concinus*, joints 2—5 dusky-brown, their relative length as in key. Pronotum broader across humeri than in either *consolidus* or *bilineatus*, the sides therefore appearing more constricted in front of humeri than in those species, disk with a well defined median groove, coarsely, sparsely, unevenly punctate. Coriaceous part of corium clothed with conspicuous prostrate yellow hairs. Both macropterous and brachypterous forms are known. Length, 1.8—2.1 mm. (Fig. 152).

Marion Co., Ind., Nov. 11. Pine, Ind., and Chicago, Ill., May 21—June 5 (*Gerhard*). Recorded from New England, New

York, Pennsylvania, Michigan and Illinois. This is the form identified as *burmeisteri* by Bueno and others, but the original description of that species is so brief and unsatisfactory that a comparison with the type is necessary to prove the identity of the two forms. It is closely allied to *concinus* but that species is easily distinguished by its longer, more slender, wholly pale antennæ and entire tip of scutellum.

II. MERRAGATA White, 1877, 113.

This genus differs from *Næogeus* mainly in the characters given in generic key. A half dozen species are known, three from Central and South America, the others from our territory.

KEY TO EASTERN SPECIES OF MERRAGATA.

- a. Apex of scutellum blunt, not bifid; joints 1, 2 and 3 of antennæ subequal in length.
 - b. General color blackish or dark chestnut-brown, the membrane with distinct fuscous spots; sides of pronotum moderately constricted, the disk with a broad, deep, longitudinal furrow. 586. **HEBROIDES.**
 - bb. Color pale chestnut-brown, the membrane milky-white; sides of pronotum more strongly and abruptly constricted, the disk with a more narrow, ill defined median groove. 587. **BRUNNEA.**
- aa. Apex of scutellum obtusely bifid; joint 3 of antennæ shorter than the others. 588. **SLOSSONI.**

586 (813¼). **MERRAGATA HEBROIDES** White, 1877, 113.

Oblong, robust. General color fuscous-black; vertex, base of tylus and two round convexities on hind portion of pronotum, reddish-brown; antennæ reddish-brown, the fourth joint fuscous; beak and legs brownish-yellow; elytra with white spots on clavus, corium and membrane much as in *Næogeus consolidus*; under surface thickly clothed with fine grayish pubescence. Head as wide across eyes as long, its front portion declivent; eyes small, prominent, coarsely granulated; antennæ short, about one-half longer than head, joints 1—3 subequal, 4 longer and stouter, fusiform. Pronotum with disk uneven, the median groove extending from apex to basal third, front portion with several foveæ beset with small punctures, hind portion gibbous each side of end of median groove; humeral angles convex, rounded. Scutellum with a fine median carina. Elytra reaching tip of abdomen, inner nervure of corium angulate at apical fourth; connexivum narrowly exposed. Length 1.6—2 mm.

Clark Junction, Ind., Aug. 7; Chicago, Ill., June 3—July 22 (*Gerhard*). Ranges from New York west to Colorado and California and south to Florida. Described from Hawaii and again by Champion (1898, 122) from Mexico. I regard the *M. foveata* Drake (1917, 103) as a synonym of *hebroides*. The only character given by Drake in his key to separate them is that

the median groove of head in *foveata* "is double, converging anteriorly and with a median ridge between them." In the Chicago specimens, identified by Bueno for Gerhard as *foveata*, the median groove is single with a distinct ridge each side. One of them was sent Mr. China, who compared it with the type of *hebroides*. He found the grooves on head to be the same, and only a few minor differences in color of antennæ and legs. He wrote: "Without inspecting the genitalia I should say that the two are one and the same species." In examples of *M. brunnea* from Florida the groove of head is variable, being very faint or wanting in some specimens, well defined and either single or double in others. The only Florida record of *hebroides* is that of Drake as *foveata* (1920, 208) from Gainesville. Only macropterous forms are known.

587 (813½). MERRAGATA BRUNNEA Drake, 1917, 105.

Macropterous Form.—Oblong, rather robust, shorter than our other two species. Pale chestnut-brown; corium, legs and antennæ yellow, the tarsi and fourth antennal darker; clavus and membrane wholly milky-white. Head hairy, declivent in front, its median groove variable, as above stated. Antennæ one-third longer than head, the fourth joint fusiform, slightly longer and stouter than the others. Pronotum abruptly and strongly constricted at apical third, the transverse impression with a row of coarse punctures, median groove nearly entire, humeral angles prominent, rounded. Scutellum with a faint median carina. Inner nervures of corium broadly rounded. *Brachypterous Form.*—Color somewhat darker; elytra represented by small white pads not reaching second dorsal. Pronotum smaller, its hind lobe less elevated and sides less constricted, humeri much less prominent. Scutellum shorter and broader. Length, 1.4—1.6 mm.

Dunedin, Fla., Feb. 23—April 25. Numerous examples taken from amongst masses of water shield, *Brasenia purpurea* (Michx.) in small ponds. Described from Ohio. Ranges from New York west to Minnesota and Nebraska and south to Florida. Drake (1920, 208) records the taking of immense numbers of nymphs and adults at Gainesville, Fla.

588 (—). MERRAGATA SLOSSONI Van Duzee, 1921, 133.

Elongate, more slender than *hebroides*. Above pale to dark reddish-brown, minutely pubescent with yellowish hairs; front lobe of pronotum, scutellum and apex of corium tinged with fuscous; a line on corium, the entire clavus and four vague spots on membrane milky-white; antennæ and legs pale brownish-yellow, the fourth antennal and tips of tarsi darker; ventral surface of abdomen blackish-brown, its edges paler. Antennæ nearly twice as long as head; joints 1 and 2 subequal, 3 shortest,

4 longer, fusiform. Beak reaching first ventral. Pronotum one-half wider at base than long, its sides rather abruptly constricted about the middle; disk unevenly, sparsely and rather coarsely punctate, humeral angles swollen, obtusely rounded. Basal portion of scutellum with a fine median carina. Elytra, in macropterous form, reaching tip of abdomen. Length, 1.4—1.5 mm.

Moore Haven, Fla., March 2; two specimens swept from low herbage along the side of a ditch. The type and only specimen heretofore known was taken by Mrs. Slosson at Biscayne Bay, Fla.

Family XXII. MESOVELIIDÆ, Douglas & Scott, 1867, 3.

THE WATER TREADERS.

Small, slender, subaquatic species having the head broad, shorter than pronotum, inserted in thorax almost to eyes, ocelli approximate, placed close to its base; eyes large, prominent; antennæ slender, 4-jointed, more than half the length of body; beak slender, 3-jointed, reaching to or behind middle coxæ, joint 2 longer than 1 and 3 united; pronotum feebly constricted in front of middle, the hind lobe convex; scutellum rather large, triangular, its base with an elevated calloused area; elytra largely membranous, variable in length, sometimes entire and surpassing abdomen, more often abbreviated, the corium long, its veins prominent; legs slender, subequal in length; tarsi 3-jointed, the basal joint minute, the second much the longest, claws inserted at the end of the third. The family is a small one, comprising only two genera. One of these is represented by four species in the eastern states. Hungerford (1917, 73), writing of the habits of *M. mulsanti*, our most common species, says:

"It is at home on the floating vegetation growing in the shallow waters of pools, where the clumps of sedge spread their slender stems upon the water from the bordering bank, where young cat-tails spring up and green algæ carpet the surface of the waters. The writer has found them about old logs projecting from the water, in clumps of smartweed at the water's edge, as well as on rafts of filamentous algæ and leaves and stems of plants procumbent upon the surface. They are cautious creatures but do on occasion fall upon fairly lively prey. A fly thrown into the aquarium was seen to crawl up the side of the jar bearing an adult female *Mesovelia* with its beak attached near the caudal end of the fly which when disturbed flew to a near-by support bearing the tenacious little bug. However, the writer has come to believe that,

with *Hydrometra*, *Microvelia* and *Rheumatobates*, they are not dependent upon the chance and uncertain fare of terrestrial insects caught upon the surface film but find another, and indeed a more constant source, in the organisms that dwell below but come up to the surface film. Among these, Ostracods and like forms are available as more or less staple food and *Mesovelia* have been observed exploring the sides of floating Typha and the tangled mats of algæ for such Crustacea which they spear from the surface of the water."

The principal literature treating of our species of the family is by White, 1879; Uhler, 1884, 1894a; Champion, 1898, and Hungerford, 1917, 1920, 1924, 1925.

I. MESOVELIA Mulsant & Rey, 1852, 138.

The principal characters of this genus are set forth under the family heading. In addition, its members have the head much prolonged and declivent before the eyes; hind margin of pronotum subtruncate; clavus very large, wholly membranous; membrane without veins; hind coxæ rotatory.

KEY TO EASTERN SPECIES OF MESOVELIA.

- a. Larger, length 3.8—4 mm.; hind margin of front and middle femora with a row of spines; beak reaching base of hind coxæ; first genital of male with tufts of black setæ on lower side. 589. Mulsanti.
- aa. Smaller, not over 2.8 mm.; hind margin of front and middle femora without spines; first genital of male without setæ.
- b. Beak reaching first ventral.
- c. Head brown with a narrow median pale line; joint 1 of antennæ not passing hind margin of eye; general color mottled brown, shining. 590. Douglasensis.
- cc. Head grayish with two narrow parallel dark lines; joint 1 of antennæ surpassing hind margin of eye; general color olive-green, thickly covered with a fine grayish bloom. 591. Cryptophila.
- bb. Beak reaching between middle coxæ; head yellow with two brown stripes. 592. Amœna.

589 (814). *Mesovelia mulsanti* White, 1879, 268.

Elongate, rather slender, somewhat spindle-shaped. Color greenish with a yellowish tinge, fading to brownish-yellow; hind lobe of pronotum fuscous with a yellowish median stripe; antennæ, collar, sides and tip of scutellum, veins and cuneus of elytra and tarsi, brownish or tinged with fuscous-brown; under surface pale yellow. Joints 1 and 3 of antennæ subequal, each about as long as head; 2 shortest, 4 one-third shorter than 3. Front and middle femora armed beneath with numerous rather stout setæ. Length, 3.8—4 mm. (Fig. 153).

Marion, Putnam and Jefferson counties, Ind., June 15—Sept. 28. Frequent in quiet pools along streams among clumps of water willows; the nymphs between the dates mentioned much

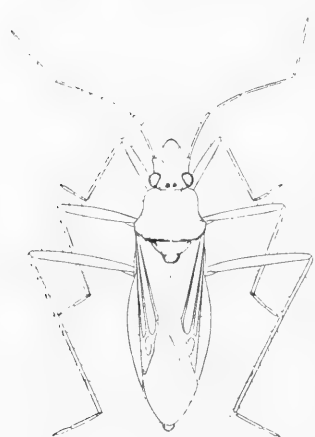


Fig. 153. Female X 10.
(After Hungerford).

more common than the adults. Utopia, Moore Haven, LaBelle, Sanibel Island and Dunedin, Fla., Nov. 18—April 25. Frequent in all stages during the winter at Dunedin in masses of waterweed and in muck in or about the margins of small ponds. Recorded from four additional Florida stations and doubtless occurs throughout that State. Ranges from New England west to Illinois and southwest to Florida, Texas, Mexico and Brazil. Of its habits in Maryland Uhler (1884, 274) in the notes on his *M. bisignata*, a synonym of *mulsanti*, says:

“The unwinged individuals appear more slender than the winged ones and often hibernate in this State. On the surface of the quiet waters which they inhabit, specimens may be seen at rest near the banks or in the midst of pond weeds. There they watch the arrival of some hasty gnat or other small insect which chances to fall into the water. This they eagerly grasp with the fore feet and proceed to suck its juices. Their movements are indescribably delicate and free. Nothing could be lighter than their motions over the surface film, walking there without making impression or ripple, and moving with the celerity of a spider.”

Hungerford states that the female “possesses an ovipositor for inserting her eggs into the stems of plants and even in the spongy wood of floating logs. The egg stage lasts seven to nine days and the nymphs pass through five instars, spending from two to three days in each stage. There is a succession of generations throughout the season, each cycle requiring about twenty-four days.”

590 (—). *MESOVELIA DOUGLASENSIS* Hungerford, 1924, 142.

Smaller but more robust than *mulsanti*. Head, antennæ, pronotum, front half of mesonotum and middle of metanotum usually brown or grayish-brown; remainder of upper surface dull yellow, more or less tinged with brown; beak, legs and under surface pale brownish-yellow; tarsi and tip of beak darker. Tylus, basal joint of antennæ and femora each with one or more short setæ. Antennæ filiform, nearly as long as body, joint 1 stoutest, shorter than head, feebly curved, 2 shortest, 3 and 4 very slender, the latter slightly the shorter, about double the length of

2. Elytra wanting. Connexivum strongly reflexed. Front femur and tibia subequal in length; hind tibia one-third longer than hind femur. Male with a fringe of short spines on the front margins of the ventrals. Length, 1.8—2.2 mm.

Douglas Lake, Mich., July 31 (*Hungerford*). Known only from that lake. In his biological notes Hungerford says:

"The habits of this species are much as I have recorded them for *Mesovelina mulsanti* White. It seems, however, to live in much more sheltered and inaccessible places, preferring the dark and shadowy waters beneath the dense growth of *Chamædaphne* to the sun-lit haunts of its well known relative. In the pairs that I have observed mating in captivity, the males have been supported very curiously above the female by the genital clasp alone—all of the legs poised in mid-air. They have remained in copula for thirty minutes and longer. The females place their eggs in the tissues of plants after the manner of *M. mulsanti*. The first I found were in the petiole of a black water-soaked dead leaf of *Andromeda glaucophylla* Link."

591 (—). *MESOVELIA CRYPTOPHILA* Hungerford, 1925, 454.

Elongate, subcylindrical, the pronotum relatively broad and abdomen, especially that of male, slender. General color olive-green, rather thickly and finely pubescent; color of head as in key; pronotum dull brown, a median spot and an ill defined band across hind margin olive-green; mesonotum olive-green with brownish blotches; metanotum dark in front, paler behind; beneath with dark reddish-brown stripe on pleura; beak, legs and ventrals whitish tinged with pale green. Antennæ fuscous, joint 1 slightly more than one-fourth longer than 2, 3 and 4 subequal, each twice the length of 2. Interocular area half as wide as head across eyes. Pronotum cylindrical, joint 2 of hind tarsi more slender and longer than 3. Length, 2.1—2.8 mm.

Douglas Lake region, Mich., July 26 (*Barber*). Known only from a small bog where Hungerford found them in numbers on the water amidst a thick growth of floating leather-leaf, *Chamædaphne calyculata* (L.). Only the apterous form was found.

592 (—). *MESOVELIA AMÆNA* Uhler, 1894a, 218.

Elongate, oblong. Head dull yellow; tylus, base of cheeks and two stripes on vertex piceous-brown; pronotum and scutellum dark brown, the former with a vague transverse yellowish spot behind front margin; elytra in great part hyaline, the veins and apex of corium brown; membrane whitish-hyaline, the apical third or more with a fuscous blotch, this bisected by a median pale line; beak and legs yellowish-white, the tibiæ and tarsi tinged with fuscous; sterna pale brown with a leaden bloom; ventrals pale dull yellow, their sides darker. Antennæ pale brown, joint 1 slightly stouter and one-third longer than 2; 3 and 4 very slender, subequal, each about one-half longer than 1 and 2 united. Head with a narrow impressed line between the brown stripes. Pronotum with basal two-

thirds strongly convex, hind margin broadly concave, humeral angles prominent, nodulose, the margin behind them more reflexed than in front. Corium with only the apical third and three veins coriaceous, remainder membranous. Length, 2 mm.

Dunedin, Fla., Nov. 24. One specimen taken from a ditch along the margin of a pond in pine woodland one-half mile from bay front. Apparently a neotropical submaritime species which was described from Grenada and has not before been recorded from this country. Uhler's types were taken in August and September from a stream, and on a pool among grass and weeds at 50 feet above the sea.

Family XXIII. CIMICIDÆ Latreille, 1804, 235.

THE BEDBUG FAMILY.

Flat, broadly oval species of moderate size having the head broad, declivent in front; tylus stout, oblong, widened in front, produced in front of base of antennæ; beak short, stout, 3-jointed (fig. 154); antennæ slender, 4-jointed; ocelli absent;

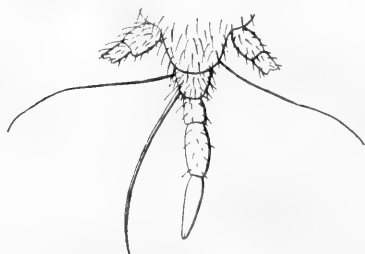


Fig. 154. Dorsal view of beak of bedbug with setæ removed from sheath. (After Lugger).

eyes very small, protruding; elytra reduced to mere pads on the base of the abdomen; scutellum short, broadly triangular, its apex acute; legs short, subequal, tarsi 3-jointed, claws without arolia.

The family comprises only a few widely distributed species which are parasitic on birds and mammals, the best known of which is the ordinary bedbug. Much has been written on this household pest. The principal available literature pertaining to it and our other species is by Uhler, 1884; Marlatt, 1896; Osborn, 1892, 1896, and Horvath, 1910, 1912. One of the two subfamilies is represented in the eastern states by two genera.

Subfamily I. CIMICINÆ Van Duzee, 1916, 33.

The members of this subfamily are distinguished by having the head not inserted in thorax to eyes; beak reaching between the front coxæ; elytra with outer margins not reflexed; middle and hind coxæ well separated.

KEY TO EASTERN GENERA OF CIMICINÆ.

- a.* Front margin of pronotum widely and deeply concave; pubescence of body very short except along the margins; joint 3 of antennæ longer than 4. I. CIMEX.
- aa.* Front margin of pronotum shallowly concave, nearly straight at middle; pubescence long and sericeous; joints 3 and 4 of antennæ subequal. II. CECIACUS.

I. CIMEX Linnæus, 1758, 441.

Head longer than median part of pronotum, broader across the eyes than long, its hind portion broadly rounded; antennæ with joints 1 and 2 much stouter than the others, joint 1 very short, not surpassing tip of tylus, 2 and 3 each nearly as long as head, 4 three-fifths the length of 3; thorax with side margins broadly rounded, strongly reflexed; margins of thorax and elytra fringed with numerous curved hairs; elytra each reduced to a single short plate without membrane or clavus. Two species occur in the eastern states.

KEY TO EASTERN SPECIES OF CIMEX.

- a.* Commissure of elytra shorter than scutellum; joint 2 of antennæ slightly shorter than 3; fringing hairs of pronotal margin shorter than width of eye. 593. LECTULARIUS.
- aa.* Commissure of elytra longer than scutellum; joints 2 and 3 of antennæ equal in length; fringing hairs of pronotum longer than width of eye. 594. PILOSELLUS.

593 (836). CIMEX LECTULARIUS Linnæus, 1758, 441.

Broadly oval. Color a uniform rather dark reddish-brown, often with a yellowish tinge; antennæ, beak, tibiæ and tarsi paler. Elytra with hind margin nearly straight, their inner apical angle broadly rounded. Abdomen very wide, suborbicular. Other characters as above given. Length, 5—6 mm. (Fig. 155).

Lake and Marion counties, Ind., April 1—June 5. Sao Paulo, Brazil, Dec. 17; Santiago, Chile, Jan. 22 (*H. S. B.*). This is the festive "bedbug," known the world over for its blood-sucking propensities with man as the victim. It is doubtless common throughout Indiana and the entire United States, being especially so in ill-kept houses and hotels. Like the flat-bodied cosmopolitan cockroaches it easily conceals itself in crevices of ships and so has followed everywhere man in his wanderings. Marlatt (1896, 32) has given an excellent account of its habits and distribution from which I quote as follows:

"This disgusting human parasite, the very discussion of which is tabooed in polite society, is practically limited to houses of the meaner

sort, or where the owners are indifferent or careless, or to hostelryes not always of the cheaper kind. The careful housekeeper would feel it a signal disgrace to have her chambers invaded by this insect and, in point of

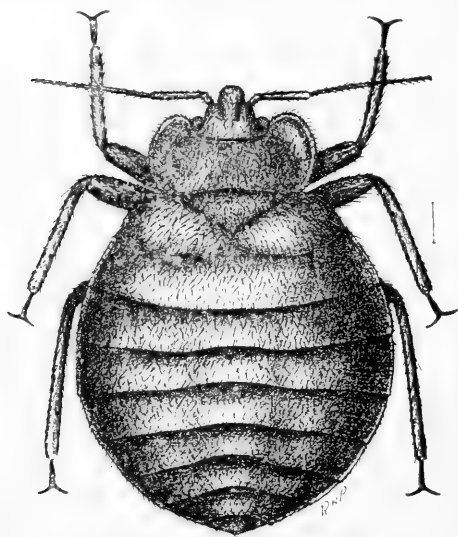


Fig. 155, X 10. (After Lugger).

fact, where ordinary care and vigilance are maintained the danger in this direction is very slight. The presence of this insect, however, is not necessarily an indication of neglect or carelessness, for, little as the idea may be relished, it may often gain access in spite of the best of care and the adoption of all reasonable precautions. It is very apt to get into the trunks and satchels of travelers, and may thus be introduced into homes. Unfortunately, also, it is quite capable of migrating from one house to another, and will often continue to come from an adjoining house, sometimes for a period of several months, gaining entrance daily. Such mi-

gration is especially apt to take place if the human inhabitants of an infested house leave it. With the failure of their usual source of food, the migratory instinct is developed, and escaping through windows, they pass along walls, water pipes or gutters, and thus gain entrance into adjoining houses.

"The bedbug is thoroughly nocturnal in habit and displays a certain degree of wariness and caution, or intelligence, in its efforts at concealment during the day. It thrives particularly in filthy apartments and in old houses which are full of cracks and crevices in which it can conceal itself beyond easy reach. It usually leaves the bed at the approach of daylight to go into concealment either in cracks in the bedstead, if it be one of the old wooden variety, or behind wainscoting, or under loose wall-paper, where it manifests its gregarious habit by collecting in masses together. The old-fashioned heavy wooden bedsteads are especially favorable for the concealment and multiplication of this insect, and the general use in later years of iron and brass bedsteads has very greatly facilitated its eradication. They are not apt to be very active in winter, especially in cold rooms, and ordinarily hibernate in their places of concealment.

"The bedbug, on account of its habits of concealment, is usually beyond the reach of powders, and ordinary insect powders, such as pyrethrum, are of practically no avail against it. If iron or brass bedsteads are used the eradication of the insect is comparatively easy. The most

practical way to effect this end is by very liberal applications of benzine or kerosene, or any other of the petroleum oils. These must be introduced into all crevices with small brushes or feathers, or by injecting with small syringes. Corrosive sublimate is also of value, and oil of turpentine may be used in the same way. The liberal use of hot water, wherever it may be employed without danger to furniture, etc., is also an effectual method of destroying both eggs and active bugs."

594 (837). *CIMEX PILOSELLUS* (Horvath), 1910, 12.

Broadly oval. Dark reddish-brown; scutellum fuscous; upper surface rather sparsely punctate and clothed with moderately long, suberect yellowish hairs. Pronotum with apex less deeply emarginate than in *lectularius*; side margins narrowly but distinctly reflexed and ciliate with long hairs. Scutellum three times as wide as long. Elytra with inner margin or tips subtruncate and longer than scutellum; hind or apical margin feebly curved, the outer angle strongly rounded. Femora rather strongly swollen, not grooved beneath. Length, 3.8—4.3 mm.

Ranges from Maine westward to British Columbia and the Pacific states; in the east not recorded south of North Carolina. Parasitic on various species of bats, and probably occurs with them over the entire United States. Differs from the European bat bug, *C. pipistrelli* Jen., by the much more widely dilated sides of pronotum.

II. *ÆCIACUS* Stal, 1873, 104.

In addition to the characters given in key, this genus differs from *Cimex* in having the head subequal in length to median part of pronotum; joints 3 and 4 of antennæ less slender, filiform; apex of pronotum obtusely sinuate, its front angles but little prolonged; elytral pads more narrowed within. Two species are known, one occurring in our territory.

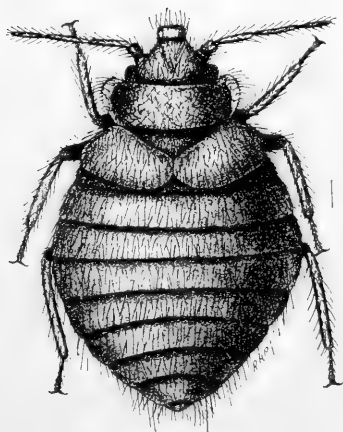


Fig. 156, X 12. (After Lugger).

595 (838). *ÆCIACUS VICARIUS* Horvath, 1912, 261.

Broadly oval, abdomen almost circular. Pale reddish-brown; tylus, elytra, beak and legs dull yellow. Joint 1 of antennæ shorter than tylus, one-third the length of 2; 3 and 4 subequal in length, each slightly longer than 2.

Pronotum more than twice as wide as long at middle, disk coarsely sparsely punctate, sides rounded, narrowly reflexed, front angles obtuse, hind ones rounded, hind margin truncate. Elytra very short, trans-

versely oblong, disk coarsely punctate, inner apical angles narrowly rounded. Dorsal segments of abdomen each with four or five transverse rows of close-set punctures, each puncture, as well as those of pronotum and elytra, bearing a long inclined yellowish hair. Femora distinctly swollen, their front side flattened and with a wide shallow groove. Length, 3.6—4.5 mm. (Fig. 156).

Yarmouth, Nova Scotia, July 29; taken from the nest of cliff swallow (*Davis*). Ranges from Nova Scotia and New England west to Iowa, Colorado and California. Not taken but probably occurs in Indiana. Not recorded from the southern states. Occurs in the nests of chimney swifts and swallows and probably of wide distribution throughout our territory.

Superfamily MIROIDEÆ Kirkaldy, 1906a, 369.

Small species of variable, but usually oval, flattened form and delicate texture having the antennæ 4-jointed, longer than head, the two apical joints usually more slender than the basal ones; pronotum always present; scutellum usually distinct; elytra of macropterous forms (except in *Cryptostemmatidæ*) with five divisions, viz., clavus, corium, embolium, cuneus and membrane, the embolium not always distinct, the veins of membrane either free or forming one or two closed cells (fig. 1); meso- and metasterna separated by a distinct suture; front legs never raptorial; tarsal claws, except in some *Miridæ*, with out arolia; last two or more ventrals or genital segments of female cleft along the middle and enclosing between them a narrow grooved sheath for the ovipositor (pl. VIII, figs. 9 and 11). The superfamily, as thus characterized, comprises six of our eastern families.

KEY TO EASTERN FAMILIES OF MIROIDEÆ.

- a. Ocelli present.
- b. Tarsi 3-jointed.
- c. Beak 3-jointed; joints 3 and 4 of antennæ usually very slender, and beset with numerous long spreading hairs (pl. VII, fig. 2).
- d. Membrane in macropterous forms well defined and with one to four free longitudinal veins, these often faint or obsolete; head porrect; both macropterous and brachypterous forms known; osteola present; length, 1.8 or more mm. Terrestrial or arboreal, often beneath bark; mainly predaceous.
- Family XXIV. ANTHOCORIDÆ,^{70a} p. 621.
- dd. Membrane absent or very poorly defined; disk of corium with one or two longitudinal veins reaching almost to apex (pl. VII, figs.

^{70a} Since the pages treating of this family were in type, there has appeared a paper by Drake & Harris (1926) in which seven new species from the eastern states are described. These are not included in this work.

1, 9 and 13); head usually strongly declivent; macropterous forms only known; osteola absent; length (in our species) less than 1.8 mm. Terrestrial, usually hygrophilous; food habits unknown.

Family XXV. CRYPTOSTEMMATIDÆ, p. 646.

cc. Beak 4-jointed; joints 3 and 4 of antennæ without long hairs, joint 2 longer than the others united (pl. VIII, fig. 4); membrane with one or two closed cells (pl. VIII, fig. 10); head either porrect or vertical; length less than 2.8 mm. Arboreal, living among lichens on the bark. Family XXVI. ISOMETOPIDÆ, p. 652.

bb. Tarsi 2-jointed; beak 4-jointed, the third joint very small, or 3-jointed; venation of elytra as in pl. VIII, fig. 2; length less than 1.5 mm. Habits unknown.

Family XXVII. MICROPHYSIDÆ, p. 658.

aa. Ocelli absent; beak 4-jointed; tarsi (except in *Peritropis*) 3-jointed.

e. Joint 1 of beak scarcely longer than broad, not extending backward beyond middle of eyes; membrane with a single large semicircular cell; length, 4 mm. Habits unknown.

Family XXVIII. TERMATOPHYLIDÆ, p. 659.

ee. Joint 1 of beak longer than broad, generally surpassing hind margin of head; membrane with two, sometimes only one, small cells near base. Terrestrial, thamnophilous or arboreal; usually phytophagous, rarely predaceous. Family XXIX. MIRIDÆ, p. 660.

Family XXIV. ANTHOCORIDÆ Amyot & Serville, 1843, 262.

THE FLOWER-BUGS.

Very small oval or oblong-oval sub-depressed bugs having the head long, porrect, inserted in thorax to or almost to eyes; tylus stout, prominent, protruding between and in front of bases of antennæ, its apex blunt; ocelli present; bucculæ wanting; beak 3-jointed, its apex acuminate, the first joint usually shorter than head; antennæ 4-jointed; pronotum short, more or less trapezoidal; scutellum small, triangular; mesoscutum in part or wholly visible; elytra usually present, covering the abdomen and with a distinct cuneus and embolium; membrane without closed cells, its veins few or wanting; legs short, subequal in length, the front ones not raptorial, tarsi 3-jointed; metasternum with a more or less distinct osteolar channel connecting with the scent glands. Males with a single asymmetrical genital plate; genitals of females with a narrow median sheath flanked on each side with two large triangular plates.

About 200 species are known, distributed in all parts of the world. They occur beneath loose bark, between the culms and leaf-stems of plants, under piles of decaying weeds and dead

leaves, in decaying fleshy fungi, in the heads of flowers and occasionally in the nests of birds and mammals. Some are known to be predaceous, feeding on small, soft-bodied insects, which they find among the anthers of flowers. Fewer than 40 species are known from America north of Mexico. These are divided among three subfamilies. The principal literature treating of them is by Reuter, 1871, 1884; Uhler, 1894a, 1894b; Champion, 1900, and Parshley, 1920, 1923.

KEY TO SUBFAMILIES OF ANTHOCORINÆ.

- a.* Basal margin of pronotum not deeply emarginate; scutellum not transversely sulcate; cell of the inner wings with a hamus.
- b.* Third and fourth joints of antennæ slender, linear and beset with numerous long hairs; hamus with a connecting vein; front femora usually more or less swollen. Subfamily I. LYCTOCORINÆ, p. 622.
- bb.* Third and fourth joints of antennæ short, fusiform, their hairs very short; hamus without a connecting vein; front femora never swollen. Subfamily II. ANTHOCORINÆ, p. 633.
- aa.* Basal margin of pronotum deeply emarginate; scutellum transversely sulcate; cell of the wings without a hamus.

Subfamily III. DUFOURIELLINÆ, p. 639.

Subfamily I. LYCTOCORINÆ Reuter, 1884, 4.

To this subfamily, as above separated, belong the majority of our eastern species. They are distributed among four genera, distinguished as follows:

KEY TO EASTERN GENERA OF LYCTOCORINÆ.

- a.* Sides of pronotum distinctly margined, the margins reflexed; apex of abdomen without long setæ; elytra everywhere thickly punctate.
- I. LYCTOCORIS, p. 623.
- aa.* Sides of pronotum not or very rarely margined, usually strongly deflexed in front of middle; apex of abdomen bearing several or numerous long setæ; elytra at most in part punctate, often wholly smooth.
 - b.* Margins of pronotum and elytra in macropterous forms ciliate; elytra and apical half of scutellum opaque, often pilose; beak reaching middle coxæ; sides of pronotum not sinuate or emarginate; osteolar channel curved backward toward apex of metasternal plate.
- II. LASIOCHILUS, p. 625.
- bb.* Margins of pronotum and elytra not distinctly ciliate; elytra and apical half of scutellum usually shining; osteolar channel curved forward.
 - c.* Sides of pronotum deflexed, not margined; transverse impression near front of pronotum very fine, scarcely distinguishable, placed between the deflexed apical angles; front femora more or less swollen; clavus impunctate.
- III. XYLOCORIS, p. 627.

- cc. Sides of front half of pronotum near apex with a narrow acute margin; transverse impression near front margin of pronotum distinct, placed *before* the apical angles; front femora long, slender; clavus with two or three rows of punctures.

IV. ASTHENIDEA, p. 630.

I. LYCTOCORIS Hahn, 1835, 19.

Oblong or oblong-oval, usually subopaque almost glabrous species having the head about as long as the middle of pronotum, tylus stout, its apex truncate, eyes large, placed close to base of head; pronotum with sides margined from near base to apex, the margins reflexed, front angles rounded, not deflexed, hind margin widely sinuate; elytra entire, reaching apex of abdomen; front coxæ short, subcontiguous; front femora elongate, fusiform, but slightly swollen, unarmed; osteolar channel nearly straight, joining at a sharp right angle a very fine carina which extends to front margin of metasternal plate. Males with a short spongy fossa at apex. Three of the five known species occur in our territory.

KEY TO EASTERN SPECIES OF LYCTOCORIS.

- a. Membrane with but one distinct vein; beak reaching middle coxæ, its first joint scarcely surpassing base of eyes. 596. CAMPESTRIS.
- aa. Membrane with four distinct veins; beak reaching hind coxæ, its first joint as long as or longer than head.
- b. First joint of beak about as long as head; second joint of antennæ one-fifth longer than width of head across eyes. 597. STALII.
- bb. First joint of beak reaching onto prosternum; second joint of antennæ three-fifths longer than width of head across eyes.

598. ELONGATUS.

596 (840). LYCTOCORIS CAMPESTRIS (Fabricius), 1794, 75.

Oblong-oval. Dark reddish to fuscous-brown; second joint of antennæ, except apex, elytra in great part and legs pale brownish-yellow; cuneus, apex of clavus and corium and a spot on each connexival fuscous or dusky; membrane hyaline with a dusky tinge. Head subequal in length to width across eyes, stouter and less prolonged in front of eyes than in our other two species. Joint 1 of antennæ scarcely reaching tip of tylus, 2 as long as head, 3 and 4 very slender, subequal in length. Other characters as above given. Length, 3.5—3.8 mm. (Fig. 157).

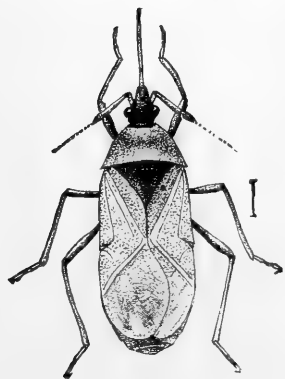


Fig. 157, X 10.
(After Lugger).

Kankakee, Ill., Aug. 24 (Gerhard).

Raleigh, N. Car., Dec. 4 (*Brimley*). A cosmopolitan species ranging in this country from Quebec and New England west to Wisconsin and Colorado and southwest to North Carolina, Texas and Mexico. It has been described under 13 different names, the two formerly most used in this country being *L. fitchii* Reut. and *L. domesticus* (Schill.) Reuter states (1884, 8) that in Europe it occurs in houses, stables, cow-sheds, the nests of swallows, piles of grain, vineyards, gardens and beneath bark. Uhler (1878, 417) says that: "In Maryland they live beneath the loose bark of decaying trees such as oak and liriodendron, but most likely are not confined to those kinds of trees. Specimens from beneath bark where the debris is wet and plastic are more robust, plethoric and darkly colored than others which I have found in drier places."

597 (843). *LYTCORIS STALII* (Reuter), 1871, 558.

Oblong or elongate-oval. Dark reddish-brown, feebly shining, almost glabrous; thorax, scutellum and cuneus often fuscous-brown; antennæ and legs pale brownish-yellow, the former with joints 3 and 4 often darker; base of embolium, apex of clavus and a vague spot on inner apical angle of embolium often dull yellow; membrane dusky-hyaline, paler towards base. Head slightly longer than wide across the eyes. Joints 3 and 4 of antennæ subequal, each about two-thirds the length of 2. Pronotum at base about twice as wide as long at middle and nearly twice as wide as apex; disk with a wide shallow transverse median impression, behind this finely rugose-punctate. Scutellum as long as the middle of pronotum, its elevated basal portion almost smooth, apical portion rugulose. Elytra entire, reaching apex of abdomen. Length, 3.8—4.2 mm.

Putnam, Vigo, Jennings and Posey counties, Ind., scarce, May 2—Oct. 7; taken from beneath loose bark of walnut and from a mass of dry decayed fleshy fungus at base of red oak stump. Dunedin, Fla., Feb. 20, one from beneath bark of dead oak; this the first definite station record for that State. Heyworth, Ill., Aug. 14 (*Gerhard*). Raleigh, Aberdeen and Lake Waccamaw, N. Car., Feb. 10—Oct. 11 (*Brimley*). Ranges from New York west to Missouri and south and southwest to Florida and Texas. Recorded also from California and Vancouver's Island.

598 (842). *LYTCORIS ELONGATUS* (Reuter), 1871, 558.

Form of *stali* but averaging longer. Color darker, the upper surface being a nearly uniform fuscous-brown; inner apical angle of embolium usually with a faint yellowish spot; antennæ and legs darker, the former dark reddish- to fuscous-brown, the femora sometimes piceous-brown; under surface dark reddish-brown, the middle of abdomen often

paler in female. Joint 2 of antennæ distinctly longer than in *stalii*, 3 slightly longer than 4, about one-half the length of 2. Pronotum with transverse impression less evident, the hind margin much more deeply concave, so that the median area behind the impression is distinctly shorter, and the humeral angles longer than in *stalii*; sides feebly sinuate and more deflexed than there. Scutellum larger, its apical half flatter, more finely rugose. Membrane with two median veins less distinct. Length, 4.5—5 mm.

Dunedin, Fla., Jan. 20; one specimen taken from beneath bark of dead pine (*W. S. B.*). Spring Hill, Ala., March 12 (*Gerhard*). Lakehurst, N. J., Sept. 6 (*Davis*). Recorded heretofore only from South Carolina and Idaho. The darker color, more deeply concave hind margin and more strongly deflexed sides of pronotum and larger scutellum are the principal characters other than those given in key which separate this species from *stalii*.

II. LASIOCHILUS Reuter, 1871, 562.

Very small, oblong or oblong-oval pubescent species, having the head as wide across the eyes as long, narrowed behind into a short neck; beak reaching to or slightly behind middle coxæ; joint 1 of antennæ usually reaching to or slightly surpassing apex of head, 2 dilated toward apex, twice or more longer than 1, 3 and 4 very slender, subequal, beset with long stiff hairs; pronotum in macropterous forms subtrapezoidal, its base twice as wide as apex, disk with an ill-defined transverse impression; elytra usually entire and covering the abdomen, opaque and bearing numerous inclined yellowish hairs; front femora elongate-fusiform, moderately swollen, more so in the males; tibiæ spinulose, usually enlarged toward apex which is obliquely truncate in males; third joint of hind tarsi as long as the others united. Other characters as in generic key. More than 20 species are known, only three of which occur with us.

KEY TO EASTERN SPECIES OF LASIOCHILUS.

- a.* Length, 2.5 or more mm.; elytra entire.
- b.* Color a nearly uniform brownish-yellow or pale reddish-brown; clavus with four or five nearly regular rows of fine but distinct punctures; margins of pronotum and embolium with a fringe of rather long yellowish hairs. 599. *PALLIDULUS*.
- bb.* Color fuscous or dark reddish-brown; clavus not or very obsoletely punctate; margins of pronotum and embolium with a fringe of short hairs. 600. *FUSCULUS*.
- aa.* Length not more than 1.5 mm.; elytra abbreviated, reaching only to base of third dorsal. 601. *GERHARDI*.

599 (844). *LASIOCHILUS PALLIDULUS* Reuter, 1871, 562.

Elongate-oblong. Pale brownish-yellow, often with a slight fuscous tinge; head, pronotum and basal half of scutellum shining; antennæ and legs concolorous, the basal joints of the former often darker. Joint 1 of antennæ slightly surpassing tip of tylus, 2 and 3 subequal, each about one-third longer than head, 4 slightly longer than 3. Beak reaching middle coxæ. Pronotum as long as head, hind angles acute, sides converging from base to apex, deflexed in front of middle; disk finely punctate, each puncture bearing a long, very fine hair, hind margin broadly and shallowly concave. Scutellum with apical half depressed, opaque, rugose-punctate. Elytra opaque, slightly surpassing tip of abdomen, both clavus and inner margin of corium distinctly punctate, elsewhere very finely punctate, each puncture with a long yellowish hair. Length, 2.5—3.3 mm.

Dunedin, Ft. Myers, Everglade and R. P. Park, Fla., November—April. I have found this to be one of the most common Anthocorids in southern Florida, occurring mainly in low wet places. In autumn and spring it frequents the tall dead grasses and weeds along the margins of ponds and lakes; in winter it hides beneath boards, piles of weeds and other cover in the vicinity of water. At Ft. Myers in late March it was sifted in numbers from the debris on the mucky bottom of an extinct wet-weather pond. Occurs occasionally at light. Ranges from South Carolina, southwest to Florida, Texas, Mexico and the West Indies. Uhler (1894a, 198) records the taking of it in numbers in Grenada, in April, while flying over open places at sunset.

600 (845). *LASIOCHILUS FUSCULUS* Reuter, 1871, 563.

Elongate-oval. Head, pronotum and mesoscutum dark chestnut- to piceous-brown, strongly shining; remainder of upper surface fuscous-brown, opaque; cuneus usually slightly darker than corium; membrane dusky, its apical margin pale; antennæ reddish-brown, the terminal joints darker; femora dark reddish-brown to piceous; beak, tibiæ and tarsi pale brownish-yellow. Antennæ with third and fourth joints subequal, each distinctly shorter than second. Pronotum shorter than in *pallidulus*, the transverse impression nearer its base, the short area behind it finely transversely rugose; front portion with a few scattered erect hairs. Scutellum finely transversely rugose. Elytra very finely and sparsely punctate, each puncture furnished with a short very fine inclined hair. Femora shorter and more swollen than in *pallidulus*; tibiæ with numerous setæ. Length, 2.5—2.8 mm.

Marion and Putnam counties, Ind., scarce, July 10—Oct. 1. Dunedin, Fla., Nov. 18—Dec. 17 (*W. S. B.*). Westfield, N. J., Sept. 4 (*Davis*). Willow Springs, Ill., July 8—Aug. 21 (*Ger-*

hard). Taken in Indiana from beneath bark of oak; in Florida by sifting weed debris and beneath bark of dead pine. Not before recorded from Florida. Known in this country heretofore only from New York, South Carolina and Texas. Recorded by Uhler from Grenada. The much darker color, shorter hairs on margins of pronotum and elytra, more basal impression of pronotum and obsoletely punctate clavus easily distinguish it from *pallidulus*.

601 (—). LASIOCHILUS GERHARDI sp. nov.

Oval, widest behind middle. Color a uniform pale reddish-brown, strongly shining. Elytra and abdomen both above and beneath clothed with rather long and coarse inclined yellow hairs. Head subconical, about as wide across the eyes as long, its apex obtuse, but slightly narrowed behind eyes, the vertex convex; eyes very small, widely separated above and beneath, placed on sides at basal third of head. Beak reaching between middle coxæ. Joint 1 of antennæ short, stout, not reaching tip of tylus; 2 subclavate, twice as long, with apex as thick, as 1; 3 and 4 more slender, subequal, each about one-third longer than 2, both they and apical half of 2 thickly beset with long spreading hairs. Pronotum subquadrate, its apex but little narrower than base, sides deflexed in front of middle, not margined, hind margin truncate; disk with front portion smooth, convex, a fine but distinct transverse line across basal third, this not reaching sides, but bent backward at right angles, thus enclosing a transverse depressed area wider than base of scutellum and in front of latter, this area minutely punctate and pilose. Scutellum very finely transversely strigose. Elytra brachypterous, without definite divisions, reaching base of third dorsal, their tips contiguous, broadly rounded; disk minutely alutaceous, rather thickly and very finely punctate, each puncture enclosing a fine yellow hair. Abdomen widest behind the apices of elytra, the last three dorsals narrowed, minutely thickly punctate and pilose. Length, 1.2—1.5 mm.

Described from ten specimens, taken Dec. 31—April 4, by sifting weed debris and bases of tufts of grass along the water's edge of the bay front near Dunedin, Fla. I take pleasure in naming this very distinct little species in honor of my friend, W. J. Gerhard, of Chicago, Ill., a devoted student of the Heteroptera who has shown me many favors in the preparation of this work.

III. XYLOCORIS Dufour, 1831, 423.

Small oval or oblong-oval subglabrous shining species having the head about as wide across the eyes as long, immersed in thorax almost to eyes; beak reaching middle coxæ; pronotum subtrapezoidal, hind margin feebly sinuate or subtruncate,

disk with a transverse post-median impression, sides in front of middle strongly deflexed, not margined or ciliate; elytra

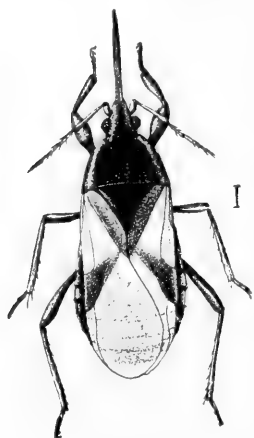


Fig. 158. *Xylocoris californicus* Reut., X S.
(After Lugger).

usually dimorphic, in macropterous forms reaching tip of abdomen, in brachypterous not farther back than fourth dorsal; front femora swollen; front tibiæ of males much enlarged near apex, obliquely truncate, spinose beneath; osteolar channel long, curved forward at middle, almost or quite reaching front margin of metapleura. About 20 species are known, four from our territory. These have been mostly recorded or described under the generic name *Piczostethus* Fieb., a synonym of *Xylocoris*. (Fig. 158).

KEY TO EASTERN SPECIES OF XYLOCORIS.

- a. Elytra wholly or in great part dull white or straw-yellow; macropterous forms only known.
- b. Elytra uniformly pale straw-yellow, with at most the tips of clavus and cuneus and outer margin of membrane fuscous; curve at middle of osteolar channel obtusely angulate. 602. GALACTINUS.
- bb. Elytra dull grayish- or yellowish-white, the cuneus and commissure and sometimes the margins of scutellum and embolium piceous-brown; curve at middle of osteolar channel in the form of an obtuse arc. 603. SORDIDUS.
- aa. Elytra in great part piceous-brown, brownish-yellow or black, membrane in macropterous form white; both brachypterous and macropterous forms known.
- c. Head, pronotum and scutellum piceous-brown, feebly shining; elytra brownish-yellow, subopaque, the corium in part, and inner basal angle of cuneus dull yellow; length, 2.5 mm. 604. CURSITANS.
- cc. Head, pronotum and scutellum black, strongly shining; elytra piceous-black, the entire corium and inner basal angle of cuneus dull white; length, 2 mm. 605. VICARIUS.

602 (846). *XYLOCORIS GALACTINUS* (Fieber), 1836, 107.

Elongate-oval. Head, pronotum and scutellum dark chestnut-brown, thinly clothed with short fine yellowish hairs. Elytra as in key, very finely and sparsely pubescent; membrane milky-white, slightly iridescent; legs brownish-yellow, the femora in part darker; under surface reddish-brown. Joint 1 of antennæ dark brown, reaching apical fourth of tylus, 2 brownish-yellow, the tip fuscous, three times the length of 1, 3 and 4 slender, subequal, each slightly shorter than 2. Pronotum with base about one-third wider than apex; post median transverse impression distinct at middle, subobsolete on sides, disk in front of it almost smooth, in

and behind it minutely rugose; side margins each with two erect slender setæ. Scutellum with median depression wide and deep. Elytra surpassing tip of abdomen by one-third the length of membrane. Length, 2.8—3 mm.

Roselle Park, N. J., June 13 (*Barber*). A cosmopolitan species ranging in this country from New York and New Jersey west to Illinois and southwest to Florida, where it was taken at Biscayne Bay by Mrs. Slosson. In England it is said to be: "Plentiful near London, in spring and summer, among the straw in heaps of stable-dung in fields."

603 (847). *XYLOCORIS SORDIDUS* (Reuter), 1871, 560.

Elongate, slender. Head, pronotum and scutellum piceous-black, subglabrous, moderately shining; elytra grayish- or yellowish-white, less shining, the commissure and cuneus piceous; membrane whitish-hyaline, dusky toward apex; antennæ, beak, tibiæ and tarsi pale brownish-yellow, often tinged with fuscous; femora, except base, piceous. Joint 1 of antennæ scarcely reaching tip of tylus, 2 more than twice as long as 1, 3 three-fifths the length of 2, 4 two-thirds as long as 3. Pronotum moderately narrowed toward apex; disk with a wide shallow impression behind the middle, smooth in front of this, finely transversely rugose in and behind it; basal margin subtruncate, the hind angles slightly prolonged. Apical portion of scutellum flattened, finely transversely rugose. Elytra about reaching tip of abdomen, not surpassing it. Length, 2.7—3 mm.

Dunedin, R. P. Park and Cleveland, Fla., Nov. 14—April 8; the first record for that State. Taken from beneath bark of dead pine and by sweeping herbage near water; both adults and nymphs on the later date. Ranges from New York and Pennsylvania, southwest to Florida, Texas, Mexico, Central America and the West Indies; the northern records perhaps to be referred to the macropterous form of the next species. A form with a purplish spot near outer margin of middle of each clavus is var. *binotatus* Reut. (1871, 560).

604 (851). *XYLOCORIS CURSITANS* (Fallen), 1807, 74.

Elongate-oval, macropterous form; more broadly oval, brachypterous one. Color as in key, sparsely clothed with very fine grayish pubescence; antennæ piceous-brown; femora piceous; beak, tibiæ and tarsi dull yellow or reddish-brown. Antennæ less than half the length of body, joints 2—4 densely hairy. Pronotum scarcely longer than head, its base subtruncate; transverse impression very faint; disk finely and sparsely punctate and with a small round fovea at middle of basal third. Elytra, brachypterous form, brownish-yellow, reaching only to base of third dorsal, with apex truncate, clavus and embolium obsolete and membrane very short. Length, 2.3—2.5 mm.

Hamilton, Marion and Putnam counties, Ind., April 11—Oct. 1 (*H. S. B.*). Staten Island, N. Y., April 12; Jamesburg, N. J., July 2 (*Davis*). In Indiana the brachypterous form is frequent locally beneath bark of beech and walnut logs or stumps, but only one example of the long-winged form has been taken. It is an introduced European, palæarctic species, heretofore recorded in this country only from New England, New York, New Jersey and Michigan, but probably of wide distribution in the northern states.

605 (849). *XYLOCORIS VICARIUS* (Reuter), 1884, 45.

Form of *cursitans*. Black or piceous-black, strongly shining, the elytra in part pale as described in key; antennæ fuscous, their hairs yellowish; tibiæ, tarsi and apical half of beak brownish-yellow, base of beak and femora piceous. Joints 2 and 4 of antennæ subequal in length, longer than the interocular width, 3 one-third shorter than 2. Pronotum trapezoidal, the base twice the width of apex, its sides subsinuate, hind margin truncate, disk feebly convex, impunctate, the usual transverse impression obsolete. Elytra in long-winged form reaching tip of abdomen; in short-winged one only to base of third dorsal, the membrane very short. Femora swollen, the front ones more strongly so. Length, 2—2.3 mm.

Dunedin, Fla., Nov. 23—March 14. Taken from beneath boards and other cover in barn yards and orange groves, mating Feb. 11; also beaten from bunches of Spanish moss. This is the first definite station record for this country. Reuter's types were from "Bogota and Americæ septemtrionalis," and were all macropterous. The small size, strongly shining black color and smooth pronotum, devoid of even a transverse impression, readily separate it from its allies. But one of the 13 specimens at hand is macropterous.

IV. *ASTHENIDEA* Reuter, 1884, 48.

Oval or oblong-oval shining species having the neck behind eyes stout, cylindrical, subequal in width to interocular area, the head in front of neck as long as the width across the eyes; ocelli large for the family; beak reaching onto mesosternum or attaining the middle coxæ; antennæ slender, pilose, the second joint swollen toward apex; pronotum trapezoidal, with ante-apical transverse impression forming a distinct collar, sides declivent and acutely margined, disk with an evident submedian transverse impression, the front portion with a smooth calloused area, hind margin widely and feebly sinuate; elytra

entire, reaching tip of abdomen, the clavus always with two or three rows, the corium usually with one or two rows, of more or less distinct punctures; membrane with veins wanting or almost invisible; hind coxæ contiguous; femora all elongate, but little swollen. Genital segment of male oval, convex, somewhat contorted or twisted to one side. Three species are known from our territory, two of which have not before been recorded from this country.

KEY TO EASTERN SPECIES OF ASTHENIDEA.

- a. Femora piceous, paler toward apex; elytra yellowish-white, the outer half of the cuneus blackish; punctures of clavus very small, almost invisible. 606. TEMNOSTETHOIDES.
- aa. Legs wholly pale; punctures of clavus distinct.
- b. Elytra pale brownish-yellow, shining, distinctly pubescent, the cuneus usually in part darker. 607. PALLESCENS.
- bb. Elytra dull grayish-white, subopaque, almost glabrous, the cuneus in great part blackish. 608. SEMIPICTA.

606 (852). *ASTHENIDEA TEMNOSTETHOIDES* Reuter, 1884, 51.

Oblong-oval. Head, pronotum and scutellum dark chestnut-brown; elytra as in key, the apical third of corium sometimes tinged with brown; membrane dusky, translucent, paler toward base; femora piceous or dark brown, yellowish at tip; tibiæ yellow, brownish at middle; coxæ, trochanters and tarsi dull yellow; beak and ventrals dark brown, shining, sterna yellowish. Joint 1 of antennæ brown, scarcely reaching tip of tylus; 2 yellow, apical third brownish and visibly thickened, three times as long as 1; 3 and 4 more slender, subequal, pilose, pale fuscous, united slightly longer than 2. Pronotum with posterior transverse impression deep, ill defined; calli each with a circular impression, area behind them minutely transversely strigose. Elytra surpassing abdomen by one-half the length of membrane, minutely yellowish-pubescent; clavus with two or three confused rows of small punctures; corium smooth. Length, 2.2—2.5 mm. (Fig. 159).



Fig. 159, X. 8.
(After Drake,
Tech. Pub. No.
16, N. Y. St.
Coll. For.).

Anna and Parker, Ill., June 27—July 14 (*Ill. Nat. Hist. Surv. Coll.*). Described from Illinois. Recorded elsewhere only from the Cranberry Lake region of New York.

607 (—). *ASTHENIDEA PALLESCENS* Reuter, 1884, 51.

Elongate-ovate. Color usually a nearly uniform pale brownish-yellow; inner half of cuneus often tinged with fuscous; base of pronotum and scutellum, except apex, rarely wholly or in part piceous; membrane dusky hyaline; apical joints of antennæ tinged with fuscous, beak and legs wholly pale. Beak reaching mesosternum, its basal joint

reaching middle of eyes. Antennæ slender, slightly longer than head and pronotum united; joint 1 reaching tip of tylus, 2 as long as head, 3 and 4 very slender, each about two-thirds the length of 2. Pronotum trapezoidal, its base broadly and shallowly concave, less than twice as wide as apex; disk with a wide and rather deep median transverse impression, its front portion transversely convex, hind one depressed, finely transversely rugose; sides of disk in front of middle somewhat declivent, distinctly margined, broadly rounded. Elytra slightly surpassing tip of abdomen, clavus with three rows of fine punctures, corium and embolium very finely and sparsely punctate, each puncture bearing a rather long very fine inclined yellow hair. Length, 2.5—2.8 mm.

Royal Palm Park, Fla., March 14—Dec. 12. A dozen or more specimens taken by sifting decaying vegetation in low damp places and by beating dead leaves of royal palm in a dense hammock. Described from Vera Cruz, Mexico; known elsewhere only from Guatemala and Nicaragua; this being the first record for this country.

608 (—). *ASTHENIDEA SEMIPICTA* sp. nov.

Elongate-oblong. Head, except tylus, pronotum, basal half of scutellum and under surface piceous-black, strongly shining; apical half of scutellum and cuneus, except inner basal angle, fuscous-black, subopaque; elytra pale clay-yellow or grayish-white, almost glabrous, feebly shining; tylus, beak and legs testaceous, often more or less tinged with fuscous. Joints 1 and 2 of antennæ pale brownish-yellow, 3 and 4 dusky yellow; 1 reaching tip of tylus, 2 three times as long as 1, 3 and 4 subequal, each two-thirds the length of 2. Pronotum about twice as wide at base as apex, sides feebly sinuate, very finely margined; disk with main transverse impression at basal third, the front portion smooth and transversely convex or calloused; hind portion finely rugose-punctate, basal margin shallowly and broadly concave. Elytra entire, surpassing abdomen by nearly one-half the length of membrane; clavus with three rows of distinct punctures; corium with a single row of similar punctures along the inner edge. Length, 2.5—2.8 mm.

Miami, R. P. Park and Ft. Myers, Fla., March 11—April 9. Taken at Ft. Myers by sifting debris from the bed of an extinct pond; at Miami by beating along the edge of Brickell Hammock, and at the Park by sifting the nest of a wood rat found in the base of a clump of cat-tails and other vegetable debris. The head is much longer than in the type of *A. picta* (Uhl.), a West Indian species, with which specimens were compared by China. Resembles *temnostethoides*, but legs wholly pale and clavus much more distinctly punctate.

Subfamily II. ANTHOCORINÆ Reuter, 1884, 55.

Small oblong or elongate-oval species having the last two joints of antennæ fusiform or linear, sometimes compressed, never filiform or pilose with long hairs; hamus in the cell of inner wings with a lower branch which extends down toward the original vein; front femora never much swollen; front tibiæ of male simple, the apex not dilated. Four genera are represented in our territory.

KEY TO EASTERN GENERA OF ANTHOCORINÆ.

- a.* Front lobe of pronotum narrow and subconical, its apex forming a continuous outline with the cylindrical neck of head; humeral angles of pronotum dentiform or nodulose; membrane with only one vein. I. MACROTRACHELIELLA, p. 633.
- aa.* Pronotum trapezoidal, its outline not continuous with neck; humeral angles not dentiform or nodulose; membrane with three or four veins.
 - b.* Collar of pronotum distinct; membrane with four veins, the inner ones sometimes very faint; second joint of antennæ distinctly longer than width of interocular area.
 - c.* Sides of pronotum not or very slightly flattened; corium not or obsoletely punctate; sides of osteolar channel not elevated toward apex. II. ANTHOCORIS, p. 634.
 - cc.* Sides of apical half of pronotum with the margins distinctly flattened; corium rather densely and finely punctate; sides of osteolar channel elevated toward apex. III. TETRAPHLEPS, p. 635.
 - bb.* Collar of pronotum wanting; membrane with three veins; second joint of antennæ not longer than width of interocular area. IV. ORIUS, p. 637.

I. MACROTRACHELIELLA Champion, 1900, 322.

Small oblong sparsely pubescent, shining species having the head as long as pronotum and continuous with the outline of the latter; eyes distant from front of pronotum; beak not reaching front coxæ; pronotum with a short collar, its hind lobe short, wide, with sides rapidly converging, the basal margin rather deeply and widely concave and humeral angles either prolonged as a short outward-projecting tooth or nodulose above; embolium of elytra narrow, linear; mesosternum convex with a short median carina in front; osteolar channel long, curved forward, and reaching both side and front margins of metapleurum. Two species are known, one from Mexico and Panama, the other from New England.

609 (852½). *MACROTRACHELIELLA NIGRA* Parshley, 1917c, 38.

Elongate-oblong, narrowed in front. Black, strongly polished; very sparsely clothed above and beneath with fine, stiff erect hairs; membrane dark fuscous, its margins adjoining cuneus and inner basal angle whitish; tarsi dark brown. Antennæ with joints 1 and 2, apical half of 3 and base of 4, black, finely pilose, basal half of 3 dull yellow, apical portion of 4 piceous; joint 1 not quite reaching tip of tylus, 2 twice as long as 1, enlarged toward apex; 3 two-thirds the length of 2, 4 more slender, strongly tapering, nearly as long as 2. Pronotum as above described, basal lobe convex, declivent forward, its hind angles slightly knobbed. Scutellum with basal half convex, very finely punctate, apical half flat, finely transversely rugose. Membrane surpassing abdomen. Length, 2.3—2.5 mm.

Sherborn, Mass., September 6—20 (*Frost*); taken by sifting dead leaves and other vegetable debris. Known only from Massachusetts and Rhode Island.

II. *ANTHOCORIS* Fallen, 1814, 9.

Elongate-oblong, usually finely pubescent shining species, rather large for the family and having the head longer than the width across eyes; beak reaching or slightly surpassing front coxæ, its first joint not reaching front of eyes; pronotum trapezoidal, its base widely and shallowly concave, the disk with an ill defined median transverse groove; elytra with sides parallel to apical third, the suture of the cuneus distinct; apex of abdomen with long exserted hairs; hind coxæ narrowly separated. About 20 species have been described, two from our territory, but these are herewith treated as synonyms, as there are few if any distinguishing characters in the original descriptions.

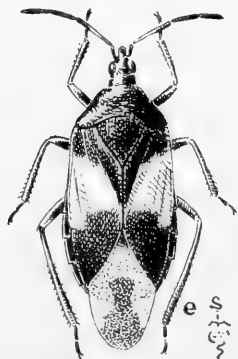


Fig. 160, X 11. (After Drake, Tech. Pub. No. 16, N. Y. St. Coll. For.).

610 (861). *ANTHOCORIS MUSCULUS* (Say), 1832, 32; I, 357.

Elongate-oblong. Black or piceous-black, shining; elytra piceous-brown, the outer half of clavus and basal half of corium grayish-white; membrane whitish-hyaline, the apical half dusky; beak dark reddish-brown, legs paler. Joints 1 and 4 of antennæ fuscous-black; 2 and 3 reddish-brown at base; 1 reaching tip of tylus, 2 almost as long as head, 3 one-half the length of 2, two-thirds shorter than 4. Pronotum with sides behind the front angles margined and slightly flattened; disk nearly everywhere very finely transversely rugose. Apical portion of scutellum similarly rugose. Elytra,

except membrane, minutely and sparsely punctate, each puncture bearing a very fine, short inclined hair. Length, 3.5—3.7 mm. (Fig. 160).

Marion, Vigo and Posey counties, Ind., Jan. 12—Sept. 24, scarce; taken in winter beneath the bark of dead willow trees, in spring while sifting dead leaves from about the bases of stumps, and in autumn from foliage of cottonwood. Willow Springs, Ill., Feb. 22 (*Gerhard*). As noted above, I consider the *A. borealis* Dallas (1852, 588), described from Hudson's Bay, a synonym of Say's species. The few structural characters which he mentions all agree with those given by Say. Combining the published records of the two forms, the known range of the species extends from Hudson's Bay and New England west to Colorado, with many gaps intervening. It is evidently a palæarctic American species, the Indiana stations being the most southern known. Van Duzee (1894, 180) mentions it as found near Buffalo, N. Y.: "Occasionally on the trunks of black willow trees and about osier bushes; sometimes very active in the bright July sunshine about these trees. Also taken in February hibernating." In Colorado it was found in August above timber line on Clematis and other plants on the steep side of the mountains.

III. TETRAPHLEPS Fieber, 1860, 262.

Medium sized oblong or oval pubescent species having the eyes slightly distant from pronotum; beak reaching onto mesosternum, joint 1 not reaching eyes, 2 more than twice the length of 3; joint 2 of antennæ clavate, 4 fusiform; pronotum with sides flattened and in front curved inward, reaching forward beyond the base of pronotal collar; hind margin widely and shallowly concave; elytra densely and finely punctate, the cuneus very long, membrane with four distinct veins; apex of abdomen with long exserted hairs; hind coxæ approximate; osteolar channel nearly straight, prominently elevated toward apex. Four of the seven known species occur on coniferous trees in the eastern states.⁷¹

KEY TO EASTERN SPECIES OF TETRAPHLEPS.

- a. General color dark brown or piceous; joint 2 of antennæ equal in length to width of head across eyes.
- b. Beak not reaching middle coxæ; elytra pale brown, the apex of clavus, corium and embolium darker. 611. AMERICANA.

⁷¹The *T. canadensis* Prov., known only by the single type, is not included in the key, as the distinctive characters given in the original description are insufficient.

bb. Beak reaching between middle coxæ; elytra dark brown, the greater part of embolium and cuneus paler. 612. OSBORNII.

aa. General color a uniform pale brown; joint 2 of antennæ longer. 613. UNIFORMIS.

611 (—). *TETRAPHLEPS AMERICANA* Parshley, 1920, 84.

Oblong-oval. Dark piceous-brown, shining; upper surface clothed with conspicuous pale inclined pubescence and with a few erect scattered setæ; color of elytra as in key; membrane brownish-hyaline, with basal and two lateral spots paler, the basal suture black; under surface and legs dark piceous, sterna, pleuræ and tips of femora paler. Antennæ piceous, one-fifth longer than head and pronotum united, joint 1 reaching middle of cheeks, 2 pale at middle, as long as width of head across eyes, 3 and 4 subequal, united one-third longer than 2, 3 cylindrical, 4 fusiform. Head slightly longer than wide. Pronotum with flattened side margins narrow, not reaching middle of collar, disk finely rugose, its hind portion minutely, sparsely but distinctly punctate. Other characters as under genus heading. Length, 3.3—3.7 mm.

Originally described from two females taken at Peaks Island, Maine, Aug. 3, and Ottawa, Ontario, Sept. 1; not recorded elsewhere.

612 (—). *TETRAPHLEPS OSBORNII* Drake, 1923, 67.

Elongate-oval. Head and pronotum dark piceous, shining; elytra as in key; membrane dusky-hyaline with pale streaks along the veins; legs dull yellow, the tarsi and basal third of femora fuscous-brown; ventrals piceous tinged with reddish-brown. Antennæ dark brown, joint 1 three-fifths the length of 3, 2 paler, as long as 1 and 3 united, 3 and 4 subequal. Upper surface clothed with fine grayish prostrate hairs. Pronotum with collar and basal portion finely transversely rugose, median portion with a smooth crescent-shaped area. Length, 3.2—3.5 mm. (Fig. 161).

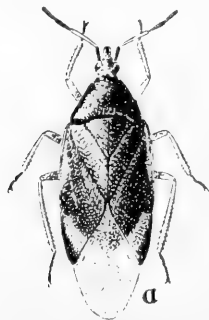


Fig. 161. X 11.
(After Drake, Tech.
Pub. No. 16, N. Y. St.
Coll. Agr.).

Known only from the Cranberry Lake region, N. Y., where it was common, July—September, on white pine, *Pinus strobus* L.

613 (—). *TETRAPHLEPS UNIFORMIS* Parshley, 1920, 85.

Oblong-oval. Color a nearly uniform pale brown, head slightly darker; membrane pale smoky brown, with vague spot at base and middle of each vein paler, tibiae and tips of femora pale straw-yellow. Antennæ one-third longer than head and pronotum united, joint 1 reaching apex of cheeks, 2 slightly longer than width of head across eyes. Head as long as wide. Pronotum with basal half distinctly transversely rugose, its punctures minute. Length, 3.6 mm.

The type and only recorded specimen is a female taken on Mt. Washington, N. Hamp. by Mrs. A. T. Slosson.

614 (—). *TETRAPHLEPS CANADENSIS* Provancher, 1886, 90.

"Black with testaceous elytra. Head long and narrow, the epistome (tylus?) reaching beyond the cheeks. Antennæ less than half the length of body, second segment longest, the last two fusiform. Elytra of a brownish shade toward middle, with a very long cuneus; membrane more or less obscure with four very distinct longitudinal veins. Under side black. Legs reddish-brown. Length, .18 inch (4.5 mm.).

"A single specimen (female) taken by us at Cap Rouge."

The above is a free translation of the original description. Except in the greater length, it will apply in a general way to either *T. americana* or *T. osborni*.

IV. *ORIUS*⁷² Wolff, 1811, IV.

Very small oval or oblong-oval finely pubescent species having the head never longer than wide across eyes; beak not passing front coxæ, its first joint not reaching eyes; joint 1 of antennæ reaching tip of tylus, 2 swollen toward apex, especially so in male, not longer than width of vertex; 3 and 4 linear, subequal, together but slightly longer than 2; pronotum trapezoidal, its basal margin feebly sinuate, front margin truncate, disk finely rugose and with but a faint transverse median groove, sides almost straight, finely margined; scutellum with basal portion strongly convex, apical portion flat, in our species very finely rugose; elytra entire, passing tip of abdomen by half the length of membrane, both cuneus and membrane quite large; hind coxæ approximate; osteolar canal long, continued as a narrow obtusely curved carina as far as the base of the metapleuron. About 20 species are known, two occurring in our territory.

KEY TO EASTERN SPECIES OF *ORIUS*.

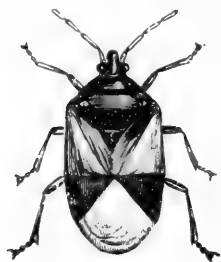
- a.* Basal joint of antennæ and femora wholly or in great part piceous; elytra in part black. 615. *INSIDIOSUS*.
- aa.* Antennæ and legs wholly pale; elytra almost wholly pale straw-yellow, the cuneus slightly tinged with fuscous. 616. *PUMILIO*.

615 (864). *ORIUS INSIDIOSUS* (Say), 1832, 32; I, 357.

Oblong-oval. Black, shining, minutely pubescent; elytra yellowish-white or pale straw-yellow, the cuneus, tips of corium and embolium, and sometimes (*tristicolor* White) the entire clavus dark piceous-brown;

⁷²This generic name has priority over *Triphleps* Fieber (1860, 266) under which our species have been previously placed.

membrane whitish-hyaline; antennæ yellow, the basal joint blackish; beak, hind tibiæ and femora, except at apex, piceous-brown; remainder of legs brownish-yellow, often in part tinged with fuscous. Middle of front portion of pronotum calloused and nearly smooth, the remainder of disk finely, thickly, rugosely punctate. Other structural characters as under generic heading. Length, 1.8—2 mm. (Fig. 162).



I

Fig. 162, X 16.
(After Riley).

This is the most common Anthocorid and one of the most common of the Heteroptera found in this country, ranging throughout southern Canada, over almost the entire United States, and south to the West Indies, Brazil and Argentina. It lives in or on the heads of various flowers, especially those of Compositæ, where it feeds on plant lice and other small, soft-bodied insects and their eggs and larvæ. In Indiana the adults are common from about May 10 to December. In Florida I have taken it only at Dunedin, R. P. Park and Lakeland, either by sweeping or beneath boards, but it has been recorded by Barber from Jacksonville, Punta Gorda and several intervening stations. Uhler (1877, 427) says that in Maryland it "is found on the ox-eye daisy and other wild flowers, and in gardens sometimes abounds upon the small fruits, sucking their juices and giving the berries a nauseous taste." It has been recorded by Garman and Jewett (1914) as frequenting young corn ears, where it feeds on the eggs of the corn-ear worm and deposits its own in the strands of corn silk, its injuries made in oviposition furnishing a place for entrance for the spores of the disease known as corn-ear rot. As suggested by Champion (1900, 327) and shown by Parshley (1919, 28) the *O. tricolor* (White) is only a color variety of *insidiosus* in which the clavus is almost wholly black. It is the form usually found in the Pacific states, but occurs sparingly with typical *insidiosus* throughout the range of the latter in this country.

616 (—). *ORIUS PUMILIO* (Champion). 1900, 327.

Form of *insidiosus* but distinctly smaller and more shining. Color much the same, the antennæ and legs wholly a very pale yellow, the beak, front part of head and last three ventrals reddish-brown or tinged with that hue; cuneus only slightly or not at all tinged with fuscous; membrane clear white. Pronotum relatively smaller with transverse impression represented only by a vague median fovea and front portion

with smooth area larger. Clavus coarsely, sparsely and shallowly punctate. Length, 1.5—1.8 mm.

Ft. Myers, Moore Haven, R. P. Park, Lakeland and Dunedin, Fla., Nov. 18—March 29. More common at Dunedin than *insidiosus*, and taken in small numbers at the other stations by sifting weed debris, sweeping flowers, especially those of the hoary lupine (*Lupinus diffusus* Nutt.), and beating bunches of Spanish moss. A half dozen specimens were taken Feb. 20 from beneath boards in a barn-yard near Dunedin. The small size, and wholly pale antennæ and legs distinguish it at once from our common form. It agrees in all respects with Champion's description except that his unique type from Guatemala had the "anteocular portion of head, rostrum, antennæ and legs testaceous," whereas in the Florida specimens the first two parts mentioned are darker than the legs and antennæ. Described from Guatemala and not before recorded from this country.

Subfamily III. DUFOURIELLINÆ Van Duzee, 1916, 35.

This subfamily, the Division *Xylocoraria* of Reuter and Champion, comprises small oblong or oval species which were by Reuter separated from our other Anthocorids only by the absence of a hamus in the cell of the inner wing. As shown in the key to subfamilies there are two more easily recognized characters which can usually be used, viz., the much more deeply emarginate hind margin of pronotum and the transversely sulcate scutellum, but these are to some extent variable and the group is in reality a difficult one to define. The antennæ vary in structure, in some genera resembling those of the Lyctocorinæ, in others of the Anthocorinæ. About a dozen genera of the subfamily were recognized by Reuter, six of which are represented in our territory.

KEY TO EASTERN GENERA OF DUFOURIELLINÆ.

- a. Front femora unarmed beneath.
 - b. Head scarcely longer than width of the interocular area; beak not surpassing front coxæ; apex of pronotum sinuate or emarginate.
 - I. BRACHYTELES, p. 640.
 - bb. Head much longer than interocular width.
 - c. Front femora strongly swollen; front tibiæ curved; beak shorter than head, its second joint awl-shaped, scarcely reaching middle of eyes.
 - II. PHYSOPLEURELLA, p. 641.
 - cc. Front femora slender; front tibiæ straight; beak slender, not awl-shaped, reaching to or beyond front coxæ.

- d. Basal margin of pronotum very deeply sinuate or concave; disk of pronotum with a distinct transverse groove.
- e. Pronotum with transverse median groove confined to the disk, its hind lobe without a median longitudinal sulcus; clavus very feebly if at all punctate; osteolar channel very long, its sides merging to form a carina which curves outward to the metapleural submarginal ridge. III. *CARDIASTETHUS*, p. 642.
- ee. Pronotum with transverse median groove reaching across disk onto the sides, its hind lobe with a short longitudinal sulcus in front; clavus distinctly coarsely punctate; osteolar channel long, curved backward. IV. *PORONOTUS*, p. 643.
- dd. Basal margin of pronotum more widely, less deeply sinuate or concave; disk of pronotum without a transverse groove, but with a distinct median longitudinal one; joint 1 of antennæ scarcely reaching tip of tylus. V. *DUFOURIELLUS*, p. 644.
- aa. Front and hind femora swollen, the former dentate beneath. VI. *SCOLOPOSCELIS*, p. 645.

I. BRACHYTELES Mulsant & Rey, 1852, 104.

Small oval pubescent species having the head scarcely longer than the width at base of vertex, but slightly prolonged in front of bases of antennæ; eyes prominent; ocelli widely separated; beak reaching apex of prosternum, its first joint not reaching front of eyes; antennæ as long as head and pronotum united, joint 1 slightly surpassing tip of tylus, 2 not longer than width of head across eyes, 3 and 4 subequal, subfusiform, together slightly longer than 2; pronotum with sides in front of middle flattened, but little narrowed, acutely margined and without a distinct collar; elytra entire, in our species surpassing tip of abdomen, rather densely, finely but distinctly punctate; osteolar opening without a distinct channel, but with a long, obtusely curved carina. One of the six known species has been recorded from our territory.

617 (866). *BRACHYTELES PALLIDUS* Reuter, 1884, 118.

Color a nearly uniform pale clay-yellow; front and hind margins of pronotum and tip of scutellum often tinged with fuscous; membrane pale hyaline. Pronotum more than twice as wide at base as long, sides straight, apex about one-fourth narrower than base, disk behind calli finely, densely and distinctly punctate. Base of scutellum convex, obsoletely punctate. Length, 1.5—1.7 mm.

A West Indian species, recorded by Uhler (1886, 21) from the "Southern States," this being the only mention from this country.

II. PHYSOPLEURELLA Reuter, 1884, 124.

Elongate-oblong pubescent species having the head distinctly longer than the width across eyes, the projecting tylus shorter and narrower than interocular width; eyes prominent, occupying the full thickness of the head; pronotum with hind margin deeply and widely sinuate or concave, disk with pre-apical transverse impression fine but evident; median transverse impression ill defined, the area in front of it with callus but little elevated, and with a short posterior longitudinal median groove, hind portion depressed at middle; elytra entire, the membrane 4-veined, the three outer ones with bases remote and equidistant one from the other, the inner one with base forked, enclosing a small triangle; osteolar channel surpassing middle of metasternal plate, its apical portion curved backward; front femora in our species more evidently swollen than the others, with the lower inner margin beset with numerous fine setæ; front tibiæ distinctly curved; mesopleura strongly rugose.

This genus was founded by Reuter for a single species, the *Cardiastethus mundulus* White, from Hawaii. Specimens from Florida agree in all respects with the generic characters as given by Reuter, except that the pubescence is mostly very short, the side margins of pronotum and embolium not ciliate with long hairs and the front femora are setose beneath.

618 (—). PHYSOPLEURELLA FLORIDANA Blatchley, 1925, 47.

Elongate-oblong, subparallel. Head, front lobe of pronotum, scutellum and under surface pale to dark reddish-brown, strongly shining; hind lobe of pronotum with the basal margin and humeral angles fuscous-brown; elytra, except membrane, dull straw-yellow with cuneus and a more or less evident cross-bar across the apical third of clavus and corium fuscous; membrane whitish-hyaline, the basal half tinged with dusky; antennæ, beak and legs pale brownish-yellow. Joint 1 of antennæ slightly surpassing the truncate tip of tylus, 2 linear, about as long as head, 3 and 4 more slender, subequal, together slightly longer than 2. Pronotum as described above, its sides obtusely margined, the deeply concave hind margin with a fringe of yellowish hairs; disk with a short ridge each side of middle connecting the two lobes, the hind lobe depressed and punctate at middle, its humeral angles broad, obtusely rounded. Scutellum with basal portion less elevated than usual, apical portion flattened, with a bilobed fovea at base, apex acute. Elytra but slightly surpassing abdomen, clavus finely irregularly punctate, corium and embolium very minutely punctate, all the punctures each bearing a short fine appressed hair. Genital plate of male transverse, its hind margin broadly rounded. Length 2.8—3 mm.

Dunedin, Fla., March 5—April 3, two specimens beaten from the dead leaves of cabbage palmetto. The short subulate beak, setose front femora, curved front tibiæ and peculiar sculpture of pronotum distinguish this form from any of our known eastern species of the subfamily. In the co-type the dark bar across the tips of clavus and corium is less evident than in the type.

III. *CARDIASTETHUS* Fieber, 1860, 266.

Oblong or ovate pubescent species distinguished from their allies by the characters given in key and by having the antennæ pilose, the last two joints slender, linear or subfusiform, the second swollen toward apex; pronotum with collar very short but evident, callus of front lobe more or less elevated; middle portion of hind lobe depressed, the basal margin deeply concave; scutellum transversely sulcate; embolium of elytra with apex nearly as wide as that of corium; membrane 4-veined, the three inner ones not widely separated, their bases equidistant and not forked, the two outer ones with bases more remote but their apical halves converging; hind coxæ contiguous, femora all slender. Nearly 20 species have been described, mostly from the Old World or tropical America, three occurring in the United States and our territory.

KEY TO EASTERN SPECIES OF *CARDIASTETHUS*.

- a.* Membrane uniformly dusky or with only a narrow pale line adjacent to the suture; length not over 2.2 mm.
- b.* Side margins of embolium subparallel, straight or but slightly rounded toward apex; dull clay-yellow, the apex of cuneus more or less piceous. 619. *ASSIMILIS*.
- bb.* Side margins of embolium distinctly rounded toward apex; pale brownish-yellow, the clavus, corium and cuneus in part fuscous. 620. *PERGANDII*.
- aa.* Membrane pale fuscous with a narrow stripe on the inner side and a triangular spot on outer basal angles pale hyaline; general color piceous, the elytra fuscous, opaque, with parts of the clavus and embolium paler; length, 2.4 or more mm. 621. *LURIDELLUS*.

619 (867). *CARDIASTETHUS ASSIMILIS* (Reuter), 1871, 564.

Oblong-oval. Dull brownish-yellow; basal half of pronotum, scutellum, apical halves of clavus and corium, fourth joint of antennæ, base of membrane and sides of abdomen usually heavily tinged with fuscous: ocelli dull red, placed near the inner basal angles of the eyes. Pronotum with median transverse groove, short, rather shallow, its ends curved slightly forward; transverse callus of front lobe prominent, almost smooth; hind lobe and sides of front one rather densely finely punctate.

Elytra similarly punctate, each puncture bearing a very fine appressed yellowish hair, costal margin of corium ciliate with very short hairs; membrane surpassing abdomen by nearly one-half its length. Other characters as under generic heading. Length, 1.6—1.8 mm.

Miami, R. P. Park, Cabe Sable, Caxambus, Ft. Myers, La Belle, Moore Haven and Dunedin, Fla., Nov. 23—April 23. A West Indian species, recorded by Barber from Lakeland and Marco, Fla., and by Van Duzee from South Carolina and Texas. Specimens were compared by China with those in the British Museum identified by Champion, and differed only in the smaller size and rather shorter head. Reuter gave the length as 1.8—2 mm. It is one of the most common Anthocorids in southern Florida, occurring in winter in bunches of dead vines, beneath bark of dead limbs, and in bunches of dead leaves of cabbage palmetto, especially in or about wet hammocks; in spring on vegetation in low moist ground.

620 (868). *CARDIASTETHUS PERGANDII* Reuter, 1884, 141.

Oblong-oval. Pale brownish-yellow, moderately shining, clothed with fine pale pubescence; apical third of scutellum, clavus, apical half of corium and inner half of cuneus, fuscous to piceous; membrane pale fuscous, its margin toward apex subhyaline; beak, except basal joint, and legs pale straw-yellow. Head slightly wider than long, eyes large, coarsely granulate. Pronotum more than twice as wide at base as long, sides visibly curved, apex as wide as median length, disk behind calli strongly transversely impressed, finely transversely strigose. Length, 1.8 mm.

Originally described from a single female taken at Washington, D. C., and not recorded elsewhere.

621 (869). *CARDIASTETHUS LURIDELLUS* Fieber, 1860, 271.

Oblong. Piceous, shining, finely pubescent; antennæ yellowish, testaceous, joints 3 and 4 and apex of 2, dusky; elytra fuscous, commissure, a vague stripe along inner half of embolium and cuneus, and a spot on corium near apex of embolium, dull yellow; membrane as in key; legs straw yellow, coxæ tinged with fuscous. Pronotum with sides feebly curved, calli strongly elevated, disk behind them distinctly transversely impressed, almost smooth. Length, 2.4 mm.

Originally described from Pennsylvania and recorded only from there.

IV. *PORONOTUS* Reuter, 1871, 561.

The single known member of this genus is closely related to *Cardiasthetus*, differing by the characters given in generic key and by having the front lobe of pronotum shorter with a dis-

tinct collar in front, the embolium at apex as wide as the corium and the inner wings without a hamus. The genus was dropped by Reuter in his "Monograph of Anthocoridæ," one of the two Brazilian species on which it was founded being referred by him to *Cardiastethus* and the other made synonymous with *Asthenidea pallescens* Reut. Champion (1900, 317, 333) restored the generic name *Poronotus* for the latter (*Xyloricis constrictus* Stal) and pointed out the distinctive generic characters as given in key and above.

622 (—). *PORONOTUS CONSTRICTUS* (Stal), 1860, 44.

Elongate-oval. Pale brownish-yellow, strongly shining, joints 3 and 4 of antennæ and the inner half of cuneus alone being tinged with fuscous; membrane whitish-hyaline. Head slightly longer than the width across eyes; neck stout, subcylindrical. Joint 1 of antennæ scarcely reaching tip of tylus, 2 as long as head, 3 and 4 very slender, subequal, together longer than 2. Beak reaching onto mesosternum. Pronotum very short, more than twice as wide at base as apex; side margins narrow, acute, visible for the full length of disk; front lobe with convex callus very prominent, reaching the full width of disk, smooth and very shining; hind lobe feebly impressed at middle, finely and sparsely punctate. Scutellum with a rather deep transverse sulcus, coarsely and finely punctate, more coarsely so toward apex. Elytra surpassing abdomen by one-half the length of membrane; clavus very coarsely and shallowly punctate; remainder of elytra, except membrane, minutely, almost invisibly punctate, each puncture bearing a rather long appressed yellowish hair. Under surface smooth, strongly shining. Length, 2.5—2.7 mm.

Dunedin, Fla., Dec. 11—April 4. Frequent beneath cover in dry sandy places near the bay beach; especially so in or beneath piles of dead cabbage palmetto leaves, in decaying fungi and beneath freshly cut pine blocks. Described from Brazil; known elsewhere heretofore only from Orizaba, Mexico. This is but one of many neotropical forms of insect life whose northern limits of distribution are found along the shores of southern Florida. It closely resembles *Asthenidea pallescens* Reut., the latter species having been placed as its synonym by Reuter (1884, 193), but is narrower, more shining, without a hamus and with the sculpture of pronotum very different.

V. DUFOURIELLUS Kirkaldy, 1906, 121.

Elongate, subdepressed, glabrous species having the head moderately produced in front of eyes, constricted behind them; beak not surpassing front coxæ, its second joint scarcely reaching base of head; joint 1 of antennæ almost reaching tip of

tylus, 2 a little longer than width of head across eyes, 3 and 4 slender, sublinear, the fourth slightly longer than third; pronotum depressed, its sides toward apex narrowed, broadly rounded, deflexed and with a fine acute distinct margin, its base widely sinuate and median longitudinal sulcus very distinct; elytra entire, embolium narrow, membrane with four distinct subparallel veins; femora all slender and fusiform, One palæarctic European species occurs in the eastern states.

623 (871). DUFOURIELLUS ATER (Dufour), 1833, 106.

Elongate, subparallel. Piceous-brown to black, glabrous, strongly shining; membrane fuscous, iridescent, whitish toward base; joint 2 of antennæ, beak, except basal joint, tibiæ, tarsi and middle of under surface, dull yellow; femora and genital segment piceous-brown. Antennæ finely pilose. Pronotum about twice as wide at base as long, its basal third flattened, minutely transversely rugose. Length, 1.8—2.2 mm.

Willard, N. Car., April 16 (*Brimley*). Lyon, France (*British Mus. Coll.*). Heretofore recorded in this country only from New York. In Europe it is said to be gregarious throughout the year beneath loose bark of firs and other conifers.

VI. SCOLOPOSCELIS Fieber, 1863, 61.

Elongate, subparallel, depressed glabrous species having the head much prolonged in front of eyes; beak reaching middle of mesosternum; pronotum trapezoidal, subdepressed, its sides toward the apical angles widely deflexed, finely margined, basal margin widely deeply concave; elytra entire, embolium narrow, membrane 4-veined; osteolar channel in our species long, angularly curved, not reaching base of metasternal plate; front and hind femora compressed, strongly dilated, convex above, the front ones armed beneath with several distinct denticles. One of the five known species occurs in our territory.

624 (872). SCOLOPOSCELIS FLAVICORNIS Reuter, 1871, 561.

Elongate, narrow. Dark reddish-brown to blackish-piceous, shining; elytra brownish-yellow, subhyaline, inner margin of clavus, embolium and cuneus piceous or reddish; membrane and inner basal angles of cuneus pale hyaline; apical half of beak, tibiæ and tarsi pale brownish-yellow. Antennæ thickly pilose with rather long spreading hairs, joint 1 reddish-brown, stout, cylindrical, reaching tip of tylus; 2 yellow, visibly thickened toward apex, more than twice as long as 1; 3 and 4 dusky yellow, much more slender, subequal in length, united one-half longer than 2. Pronotum with apex scarcely more than three-fifths the width of base; side margins about one-fourth shorter than width of basal one,

distinctly sinuate near base, feebly curved in front of middle; basal third of disk broadly shallowly concave, the concavity minutely transversely strigose. Length, 2.8—3.5 mm.

Marion Co., Ind., Aug. 15; taken from beneath bark of willow. Geronimo, Guatemala (*British Mus. Coll.*). Described from Texas. Recorded from Pennsylvania, Florida and Mexico.

Family XXV. CRYPTOSTEMMATIDÆ Bergroth, 1914, 148.
(*Dipsocorida* Dohrn+*Schizopterida* Reut.).

THE JUMPING GROUND BUGS.

Very small oval convex species having the head usually strongly deflexed and immersed in thorax to eyes; ocelli, in all our eastern species, present but minute; antennæ 4-jointed, the terminal joints slender, beset with long spreading hairs; beak 3-jointed; pronotum subquadrate, transverse; scutellum short, triangular; elytra in our eastern species entire with costal margin thickened and usually reflexed, embolium, clavus and corium present but cuneus and membrane ill-defined, the disk with two or three longitudinal veins reaching the apical margin (figs.⁷³ 1, 9 and 13); inner wings with apical margin notched and disk with simple longitudinal veins as in fig. 3; legs short, the coxæ often greatly enlarged, tarsi 3-jointed; metapleural osteola absent; exposed ventral segments 5 or 6.

Our species usually occur in moist places on the ground beneath dead leaves and other vegetable debris, but sometimes in bunches of moss on trees and rarely on foliage of semi-aquatic plants. When uncovered or disturbed most of them leap with agility. The family is a small one, most of the American forms occurring in the tropics. Van Duzee in his Catalogue included only four from North America, placing them in the families Dipsocoridae and Schizopteridae. McAtee and Malloch, in their recent Revision (1925a), have combined these families under the name Cryptostemmatidae as proposed by Bergroth. They recognize only three genera and five species from America north of Mexico. Two other genera are now known to be represented in Florida, so that five genera, each with a single species, occur in the eastern states. The principal literature treating of our North American species is by Reuter, 1891; Uhler, 1894a, 1894b, 1904; Heidemann, 1906a; Bergroth, 1914, and McAtee & Malloch, 1925a.

⁷³The figures cited in key and descriptions of the family Cryptostemmatidae refer to those on plate VII.

KEY TO EASTERN GENERA OF CRYPTOSTEMMATIDÆ.

- a. Front width of scutellum over one-half that of hind margin of pronotum; eyes projected outward, not overlapping front angles of pronotum (fig. 2); head and tibiæ with strong bristles; propleuræ of moderate or small size, never swollen in front below the eyes; elytra with a fracture near middle of costa which does not extend onto disk, the venation as in fig. 1. (Subfamily *Cryptostemmatinæ*). I. CERATOCOMBUS, p. 647.
- aa. Front width of scutellum not over one-third that of hind margin of pronotum (fig. 8); eyes projected both outward and backward, overlapping front angles of pronotum (figs. 12, 14 and 18); head and tibiæ without strong bristles; propleuræ much swollen, extending forward to or beyond front margins of eyes (figs. 6 and 12); costa without a fracture. (Subfamily *Schizopterinae*).
- b. Metapleurum produced in the form of a sharp spike at inner hind angle (fig. 7); and (in our species) with an elevated strongly curved cross-ridge which is paralleled on sides and behind by an impressed line (fig. 10); first costal cell of elytra larger than second, the vein bounding apical margin of second cell joining costa at almost a right angle (fig. 9). II. SCHIZOPTERA, p. 649.
- bb. Metapleura never with a pronounced spike at inner hind angle; first costal cell of elytra normal, equal to or smaller than second, the vein bounding apical margin of latter joining costa obliquely (fig. 13).
- c. Elytra but slightly convex, not entirely heavily coriaceous; claval suture distinct.
- d. Head declivent, not conically produced (fig. 12); pronotum without a transverse impressed line near front margin; first and second costal cells subequal in length (fig. 13). III. CORIXIDEA, p. 650.
- dd. Head porrect, produced forward in the shape of a cone (fig. 14); pronotum with a distinct impressed line near front margin; costal cells as in fig. 16. IV. NANNOCORIS, p. 651.
- cc. Elytra strongly convex, entirely coriaceous, their venation evident; claval suture obsolete; eyes very large, overlapping half or more of side margins of pronotum (fig. 18). V. GLYPTOCOMBUS, p. 652.

I. CERATOCOMBUS Signoret, 1852, 542.

Very small oblong-oval species having the head subconical, slightly longer than wide, beset with several pairs of bristles, vertex strongly convex; antennæ long-haired throughout, joint 2 three times or more as long as 1 (fig. 2); beak reaching first ventral; pronotum convex, slightly wider than long, in our species with a distinct transverse subapical impression, humeral angles rather prominent; elytra coriaceous, entire, surpassing abdomen, in repose conjointly subtectiform, the

costal margin with a slight break near middle, the venation as in fig. 1; tibiæ beset with numerous bristles. Genital plate of male with two or three pairs of claspers (figs. 4 and 5); apical dorsal segment of female covering apex of abdomen, apical ventral segment occupying nearly half of abdomen, the

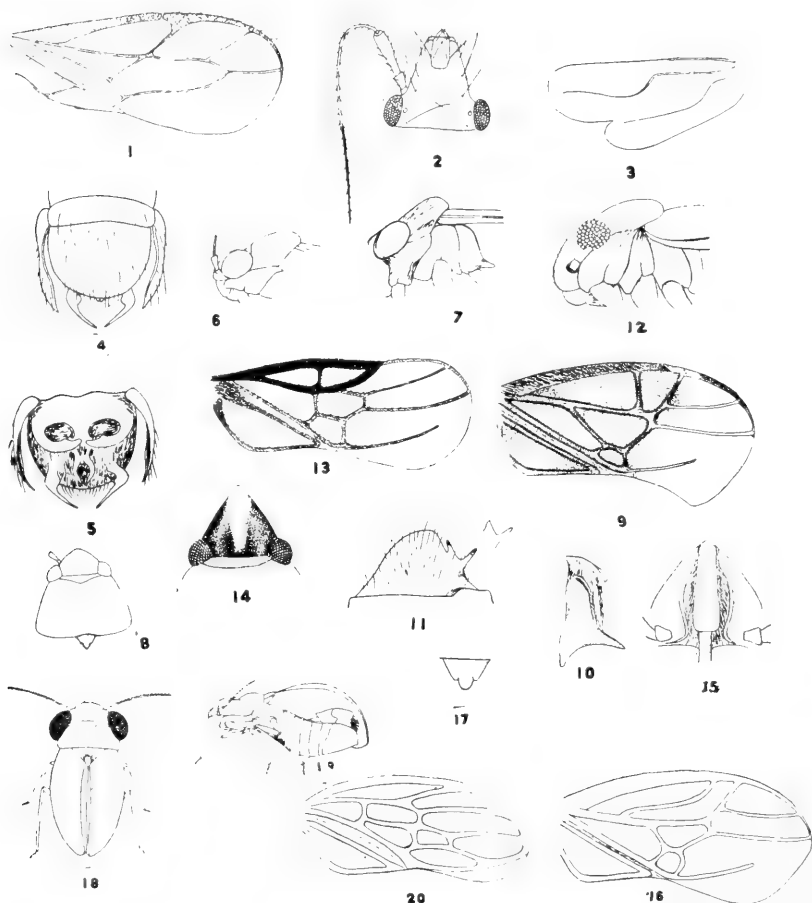


Plate VII. STRUCTURES OF CRYPTOSTEMMATIDÆ.

Figs. 1 and 3, Elytron and hind wing of *Ceratocombus vagans*; fig. 2, head of same from above; figs. 4 and 5, apex of male abdomen of same from below and above. Fig. 6, head and prothorax of *Schizoptera* from side. Fig. 7, side view of pro-meso- and metapleurum of *Schizoptera* showing metapleural spine. Fig. 8, head, pronotum and scutellum of *Schizoptera bispina*; fig. 9, elytron of same; fig. 10, metapleurum of same; fig. 11, fifth ventral of male of same, showing processes on side. Fig. 12, head and prothorax of *Corixidea major* from side; fig. 13, elytron of same. Figs. 14 and 15, head of *Nannocoris* from above and below; fig. 16, elytron of same; fig. 17, scutellum of same. Fig. 18, dorsal view of *Glyptocombus saltator*; fig. 19, side view of same, the left elytron removed; fig. 20, elytron of same.

(After McAtee & Malloch, Proc. U. S. Nat. Mus., Vol. 67, Art. 13).

sheaths of ovipositor toothed. One species occurs in our territory.

625 (—). *CERATOCOMBUS VAGANS* McAtee & Malloch, 1925a, 7.

Oblong-oval, subconvex; above and beneath minutely and indistinctly pilose. Pale yellowish- to fuscous-brown, shining, elytra often in part or wholly paler than remainder of upper surface; antennæ and legs dull yellow. Pronotum with subapical transverse impression broadly interrupted at middle, distinct on sides; disk with a faint median impressed longitudinal line, a small fovea each side behind middle and a transverse impressed line near hind margin. Scutellum convex, smooth and shining. Elytra and wings with venation as in figs. 1 and 3. Other characters as above given. Length, 1—1.7 mm.

Dunedin and R. P. Park, Fla., Nov. 25—April 9 (*W. S. B.*). Vienna, Va., Aug. 17 (*Barber*). Frequent in winter about Dunedin beneath vegetable debris and between roots of tufts of grass along the bay front; in spring taken by sweeping in low moist grounds. At the Park it was very common in the dense hammock on decaying leaves of royal palm and on the ground beneath their debris. Several were also swept from herbage in the everglades. The Virginia specimens were a nearly uniform pale yellowish-brown in hue, those from Florida much darker, several almost wholly shining black, the elytra often with a faint iridescent bluish bloom. Its known range extends from New York and Maryland southwest to Florida and Panama. The description of *C. niger* Uhler (1904, 361) from New Mexico agrees in all particulars with that of *vagans* M. & M., but they state that the type of *niger* is lost and so described the species as new.

II. SCHIZOPTERA Fieber, 1860, 268.

Small oval subconvex species having the head broader across the eyes than long, its front strongly deflexed (figs. 6 and 8); eyes large, somewhat flattened, coarsely granulated, overlapping front angles of pronotum; pronotum transverse, more than twice as wide at base as long, convex, its sides strongly deflexed, hind margin subtruncate, disk with a subangular transverse impressed line near front margin (fig. 8); elytra usually entire and much surpassing abdomen, their venation as in fig. 9. One species occurs in our territory.

626 (—). *SCHIZOPTERA BISPINA* McAtee & Malloch, 1925a, 24.

Elongate-oval, thinly clothed with very short yellowish hairs. Fus-

cous-black, apical third of elytra creamy-white, the veins slightly darker; margins of humeral angles and tips of scutellum yellowish; legs pale yellow; under surface yellowish tinged with fuscous. Antennæ with joints 1 and 2 yellow, short, glabrous, subequal; 3 and 4 fuscous, slender, subequal, beset with long hairs, each about four times the length of 1. Pronotum with disk thickly, very finely punctate, each puncture bearing a minute yellowish decumbent bristle-like hair; humeral angles swollen, subnodulose; hind margin with a small median notch. Elytra in repose subtectiform, the margins of clavus, commissure and main veins of basal coriaceous portion of corium strongly elevated (fig. 9), pale membranous portion surpassing abdomen by its full length. Fifth ventral of male with two short processes on left side, the hind one directed backward (fig. 11). Length, 1.3—1.5 mm.

Dunedin, Fla., Jan. 19—April 15; one male beaten from a bunch of Spanish moss, another sifted from vegetable debris, and a female beaten from sugar cane. Known heretofore only from Guatemala and Mexico.

III. CORIXIDEA Reuter, 1891, 17.

This genus differs from *Schizoptera* mainly by the characters given in key. The ocelli are present but minute; scutellum with disk flattened, margins slightly elevated, apex narrowed; elytra entire, the costa thickened and rounded, not flattened, the first and second costal cells subequal in length (fig. 13); suture between propleurum and pronotum extending straight back behind eye (fig. 12); inner hind angle of metapleurum produced as a rounded lobe. One of the three known species occurs in the eastern states, the others in Panama, Central and South America.

627 (—). CORIXIDEA MAJOR McAtee & Malloch, 1925a, 26.

“General color blackish, the heavily chitinated portions of upper surface with copious bluish-gray pubescence, that on head longer than in *lunigera* (a Brazilian species), more hyaline portions of fore wing bluish-cinereous; legs brownish-testaceous. Head and pronotum as seen from side and venation of fore wing as in figs. 12 and 13. Distance between eyes across back of head about twice the width of one of them; veins of clavus neither thickened nor long haired; no conspicuous pale markings on fore wings. Length, 1.25 mm.”

The above is a copy of the original description including parts of the key leading up to it. Described from a single specimen taken at light in August at Clarksville, Tenn., and now in the U. S. National Museum.

IV. NANNOCORIS Reuter, 1891, 18.

This genus is easily known from others of the family by the porrect conical head (fig. 14) with beak arising from its front end, and reaching hind coxæ; under side of head grooved and sterna hollowed out for reception of beak (fig. 15); pronotum subquadrate, about twice as wide at base as long at middle, disk in our species with two transverse impressions, one subapical, the other, wider and more ill-defined, behind the middle; elytra in great part coriaceous, their venation as in fig. 16, the veins elevated as obtuse ridges, costal margin somewhat flattened, recurved and sub-hyaline. Other characters as in generic key. Six species are known, five from tropical America, the other from our territory.

628 (—). NANNOCORIS ARENARIA sp. nov.

Broadly oval, subdepressed. Color above and below a nearly uniform fuscous-brown, thinly clothed with a very fine bluish-gray pruinose pubescence, head a paler brown; antennæ, legs and recurved costal margin of elytra dull yellow. Head regularly narrowed from eyes to apex, thickly minutely granulate without tubercle or median concavity, about three times as long as the length of an eye. Antennæ with joints 1 and 2 very short, subcylindrical, glabrous, subequal in length and thickness; 3 and 4 slender, pilose with long hairs, each about three times as long as 1 and 2 united. Pronotum finely granulated, its posterior transverse groove deeper on sides than on middle of disk, humeral angles subnodulose, hind margin truncate. Scutellum very small, triangular, the margins of its basal half thickened (fig. 17). Elytra with costal margin broadly and evenly rounded and reflexed, venation of disk as in fig. 16, tips but slightly surpassing abdomen. Ventrals finely and rather sparsely punctate, each puncture enclosing a minute yellow bristle; fifth ventral as long as third and fourth united, its apex obtusely rounded. Length, 1—1.2 mm.

Dunedin, Fla., Jan. 4—Feb. 16; a dozen or more specimens sifted from debris in the bases of dense tufts of grass growing on the middle ridge and sides of an otherwise bare sandy roadway through the pinelands, a few hundred yards from the bay front. When sifted onto paper they leaped vigorously several times in succession. It is evidently allied to *N. flavomarginata* M. & M. from Canal Zone, but that species has the hind margin of pronotum and part of apical third of elytra yellowish, and no mention is made of its having a sub-basal transverse impression on pronotum.

V. GLYPTOCOMBUS Heidemann, 1906a, 192.

Very small, broadly oval convex species having the head as broad across eyes as half the length of body, its front flattened, almost vertical; eyes as in generic key; beak reaching middle coxæ, its second joint as long as the other two united; pronotum twice as broad as long, its disk with a distinct subapical transverse impression and also a vague narrow one near hind margin, front portion with two rather large calli; scutellum broadly triangular, its basal half impressed, apical one convex, obtuse; elytra as in key, conjointly oval, slightly surpassing abdomen, each with a depression along the commissure so they can overlap either way, their venation as in figure 20. Male with five distinct ventrals, the apical one shorter than in female; genital plate reflexed on sides of abdomen beneath the elytra (fig. 19). One species is known.

629 (1280). GLYPTOCOMBUS SALTATOR Heidemann, 1906a, 194.

Dull black, above sparsely clothed with short decumbent silvery hairs; legs, beak and basal joints of antennæ brownish-yellow, femora, base of tibiæ and tips of tarsi somewhat darker; under surface dull blackish, densely pilose, the hind margin of each ventral with a fringe of short hairs. Joint 1 of antennæ slightly longer than 2, 3 somewhat thickened at base, subequal in length to 4, the latter more hairy. Elytra sparsely, coarsely and deeply punctured between the veins. Length, 1.2—1.5 mm. (Pl. VII, fig. 18).

Known only from Plummer's Island, Md., and the District of Columbia. Of it Heidemann (loc. cit.) says: "This species is most difficult to collect and is only to be found by sifting fallen leaves, rubbish and earth. The collector must watch patiently until the minute insect makes its presence known by jumping, and even then it takes a skillful hand to secure it in a vial."

Family XXVI. ISOMETOPIDÆ Fieber, 1860, 259.

THE JUMPING TREE BUGS.

Small oval flattened species having the head short, inserted in thorax to eyes, its front usually flattened and vertical; ocelli present, located between and close to the eyes, the latter very large, only moderately convex; antennæ 4-jointed, joint 2 stout, longer than the others united; beak 4-jointed; pronotum trapezoidal, much wider than head and twice or more wider than long; mesoscutum always exposed; scutellum triangular,

both it and clavus elevated above the plane of corium; elytra entire, cuneus present, membrane with one or two cells; hind femora swollen, saltatorial.

The family is a small one, only four genera represented by five species being recorded from the eastern states. They have the general form and appearance of pygmy *Saldulids*, live on the bark and dead twigs of trees, and jump vigorously when disturbed. The principal literature treating of our species is by Uhler, 1891; Heidemann, 1907; Gibson, 1917; Bergroth, 1924, 1925; McAtee & Malloch, 1924.

KEY TO EASTERN GENERA OF ISOMETOPIDÆ.

- a. Pronotum not more than three times broader than its median length, transversely convex; membrane (in our genera) with one closed cell; cuneus broader than long, not surpassing middle of membrane, its inner margin straight (fig. 4).⁷⁴ (Subfamily Isometopinae).
- b. Eyes very large, almost contiguous in front of ocelli (fig. 6); head about half as wide as hind margin of pronotum.

I. MYIOMMA, p. 653.

- bb. Eyes separated by at least half the width of one of them; head more than half as wide as hind margin of pronotum.

II. CORTICORIS, p. 655.

- aa. Pronotum very short and broad, over four times broader than its median length, not convex (figs. 10 and 13); membrane with two closed cells (fig. 10); cuneus longer than broad, nearly reaching apex of membrane, its inner margin deeply sinuate (fig. 10.) (Subfamily Diphlebinæ).

- c. Pronotum with front angles projecting in the form of a prominent lobe which is rounded on the outer side and contiguous with eyes from within (fig. 10); second antennal with a black median ring; carina of scutellum confined to apical third.

III. DIPHLEPS, p. 656.

- cc. Pronotum with front angles but slightly projecting, not touching the eyes (fig. 13); second antennal unicolorous; carina of scutellum percurrent.

IV. TERATODIA, p. 657.

I. MYIOMMA Puton, 1872, 177.

Elliptical, depressed species having the head very small, rounded above, its front flattened and sloping inward toward sternum; ocelli located close together near middle of the very narrow vertex and contiguous with eyes (fig. 6); beak reaching fourth ventral; pronotum nearly three times as wide as its median length, front margin concave, hind one sinuate, side

⁷⁴The figures cited in text and keys of this family mostly refer to those on plate VIII.

margins somewhat flattened and reflexed; sides of mesoscutum exposed, convex, the ridges oblique; scutellum equilateral, sub-convex; clavus widened behind, strongly deflexed toward

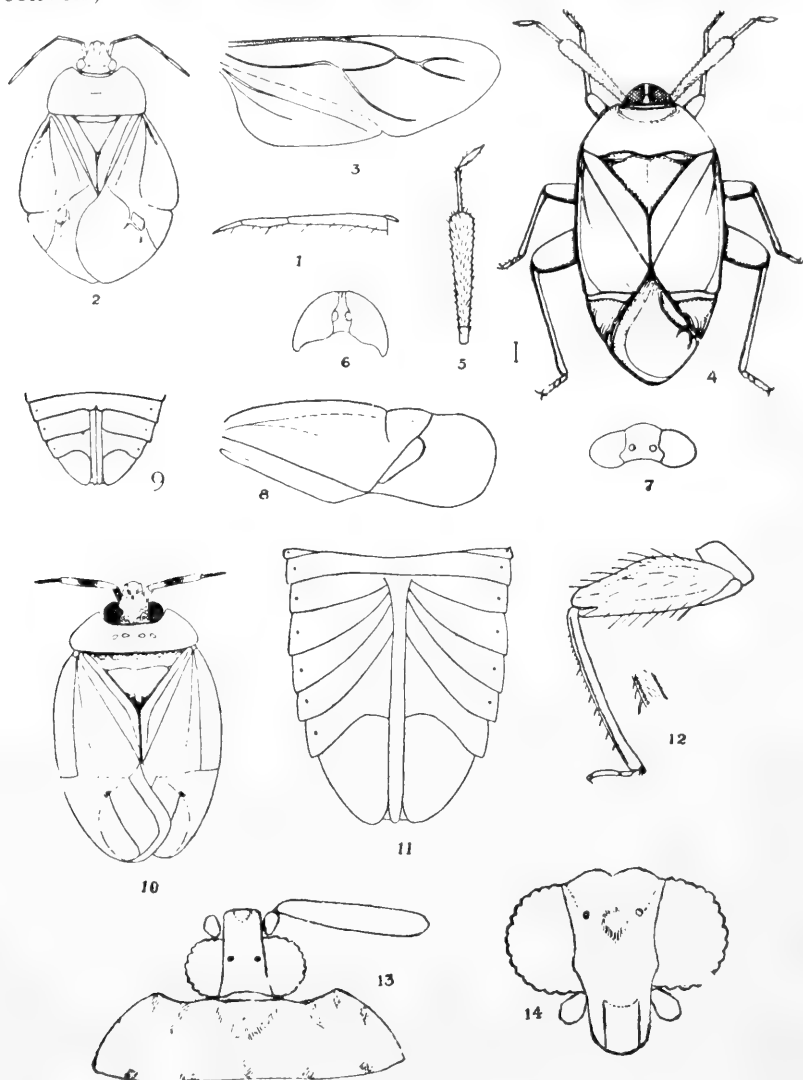


Plate VIII. STRUCTURES OF MICROPHYSIDÆ AND ISOMETOPIDÆ.

Fig. 1, Beak of *Mallochiola gagates* (M. & M.); fig. 2, entire insect of same from above; fig. 3, hind wing of same. Fig. 4, Female of *Mytomma cirriformis* (Uhl.); fig. 5, antennæ of same; fig. 6, head of same from above. Fig. 7, Head of *Corticoris pulchella* (Heid.) from above; fig. 8, fore wing of same; fig. 9, apex of female abdomen of same from below. Fig. 10, Female of *Diphleps unica* Bergr., from above; fig. 11, abdomen of same from below; fig. 12, hind leg of same. Fig. 13, Head and pronotum of *Teratodia emoritura* Berg. from above; fig. 14, head of same from in front. (Figs. 1—3, 6—12, after McAtee & Malloch; 4 and 5 after Uhler; 13 and 14, after Bergroth).

corium, with commissure as long as scutellum; elytra slightly surpassing abdomen, costal margin feebly curved, rather broadly flattened and reflexed. One species occurs in our territory.

630 (1273). *MYIOMMA CIXIIDIFORMIS* (Uhler), 1891, 121.

Elongate-oval. Dull black; head pale, brownish-yellow; base of cuneus with a somewhat calloused ivory-white crossbar; membrane fuscous-brown; legs, beak and under surface dark chestnut-brown, shining; tarsi and tips of tibiae dull yellow. Joints 1 and 2 of antennae blackish, 1 very short and stout, 2 stouter, as long as vertex and pronotum united (fig. 5); 3 and 4 fuscous, very slender, united shorter than 2, 4 fusiform, pointed, two-thirds the length of 3. Upper surface except membrane finely scabrous, sparsely punctate, each puncture bearing a very short fine hair. Length, 2.3—2.5 mm. (Pl. VIII, fig. 4).

Falls Church, Va., July 20 (*Banks*). Ranges from Long Island, southwest to West Virginia. It is said by Heidemann to "live in damp and shady places on the twigs of dead trees;" while McAtee found it on the barkless surface of a hackberry limb which was covered by a thin velvet-like growth of fungus. Uhler (loc. cit.) states that: "It is remarkable for having the head pressed back upon the sternum as in the Homoptera and its general figure distinctly recalls the form which prevails so commonly in many of the *Cixiidae*."

II. *CORTICORIS* McAtee & Malloch, 1922, 95.

Small rather broadly ovate species, having the head, viewed from above, very short, depressed, rounded in front; beak reaching to or beyond second ventral; antennae inserted on under side of head, somewhat distant from eyes, as long as pronotum and scutellum united, joint 2 longest, thickened toward apex, 3 and 4 much thinner, united about half the length of 2; eyes very large, reniform, almost covering sides of head, male, relatively smaller, female; pronotum slightly more than twice as broad as long, sides flattened, rather broadly reflexed, disk with a preapical transverse narrow ridge and a rather sharp percurrent median carina; scutellum as broad as long, somewhat elevated above the corium; elytra entire, costal margin evenly rounded and reflexed, venation as in fig. 8; membrane with one cell; abdomen of females as in fig. 9. Four species are known from the United States, two in our territory.

KEY TO EASTERN SPECIES OF *CORTICORIS*.

- a. Narrowest part of interocular area, less than width of one eye (fig. 7); color dark brown, corium whitish-yellow without fuscous markings at middle. 631. *PULCHELLUS*.

aa. Narrowest part of interocular area wider than one eye; middle and apex of corium fuscous. 632. SIGNATUS.

631 (1274). *CORTICORIS PULCHELLUS* (Heidemann), 1908a, 128.

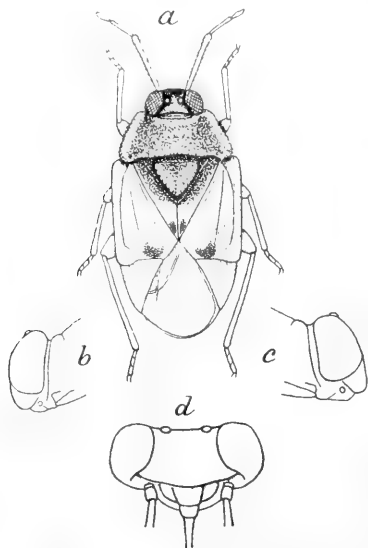


Fig. 163. a, *Corticoris pulchellus* (Heid.) X 16; b, side view of head of *C. signatus* (Heid.); c, and d, side and front views of head of *C. unicolor* (Heid.), an Arizona species. All greatly enlarged. (After Heidemann, in Proc. Ent. Soc. Wash.).

Broadly oval. Dark brown or piceous, shining, thickly clothed with subappressed fine short hairs; elytra creamy-white, basal third and tip of clavus and spot on inner apical angle of corium (sometimes on inner basal angle of cuneus) fuscous; membrane whitish, iridescent; beak, except tip, legs and ventrals 4—6 and joint 2 of antennæ yellowish-white. Front of head with a shallow depression each side near the eye. Length, 2—2.2 mm. (Fig. 163, a).

Recorded from New York, Pennsylvania and the Virginias. Taken in July and August at light and by sifting.

632 (1275). *CORTICORIS SIGNATUS* (Heidemann), 1908a, 129.

Broadly oval. Head dark brown, vertex, margins and under surface yellowish; pronotum, except basal angles, and scutellum piceous; elytra yellowish-white, base and apex of clavus and an oblique mark across corium fuscous; membrane whitish-translucent; antennæ brownish-yellow; legs yellowish white, femora often annulate with dark brown; ventrals brown, thickly pubescent; beak brownish, reaching third ventral. Pronotum and scutellum roughly punctate; upper surface clothed with fine pale hairs. Length, 2.2—2.4 mm.

Known only from Washington, D. C., and Texas.

III. *DIPHLEPS* Bergroth, 1924, 5.

Broadly oval, flattened species having the head about as long as middle of pronotum, narrower than apex of latter, tylus broad, almost vertical; ocelli located between the eyes at about their own diameters from inner margin of eyes; antennæ inserted in front of eyes; beak reaching first ventral; pronotum nearly five times as wide as long at middle, its sides flattened, margins reflexed, disk with a fine median carina, each side of which are two small calli (fig. 10), front margin broadly con-

cave, hind one feebly sinuate; mesoscutum widely exposed and marked with a transverse ridge, the suture between it and scutellum conspicuous; scutellum much broader than long, its apical third with a low obtuse median carina; elytra flattened, surpassing tip of abdomen, costal margin broadly curved, clavus widened apically, commissure as long as mesoscutum and scutellum united, cells of membrane reaching almost to apex (fig. 10); hind legs as in fig. 12. Genital cleft of female dividing all except the two basal ventrals (fig. 11). One species is known.

633 (—). *DIPHLEPS UNICA* Bergroth, 1924, 7.

Broadly oval. Dull grayish-yellow, upper surface except membrane sparsely clothed with narrow bristle-like scales; apex of tylus, two spots near inner margin of eyes and mesonotum in great part fuscous; apex of scutellum, several spots on costal margin and a dot on inner margin of cuneus blackish; membrane with numerous small fuscous spots; under surface dull yellow. Joints 1, 3 and 4 of antennæ black, basal and apical thirds of 2 yellow, middle third black; 1 and 2 stout, 3 and 4 very slender, subequal in length, united less than one-half the length of 2. Length, 2 mm. (Pl. VIII, fig. 10).

Described from Summit Co., Ohio; known elsewhere only from Urbana, Ill., and Glen Echo, Md. Taken in July and August among lichens on the bark of oak and hackberry. Females only are known.

IV. *TERATODIA*⁷⁵ Bergroth, 1924, 7.

Differs from *Diphleps* by characters given in key and in having the head narrower, subcylindrically produced beyond the eyes and extending much below the level of the sternum (figs. 13 and 14); apical margin of pronotum subtruncate, basal margin almost straight in front of mesoscutum, the latter but slightly exposed; scutellum with a percurrent median carina; claval commissure shorter, only as long as scutellum. One species is known.

634 (—). *TERATODIA EMORITURA* Bergroth, 1924, 8.

Broadly oval. Pale brownish-yellow; pronotum with small vague brownish markings along front and hind margins (fig. 13); apex of scutellum and a dot near middle of inner margin of cuneus, blackish; apical half of costal margin with a row of small fuscous spots. Joint 1 of antennæ dark brown; 2 as long as half the width of pronotum, pale

⁷⁵McAttee & Malloch (1924, 73) consider *Teratodia emoritura* to be the male of *Diphleps unica*, but Bergroth (1925, 163) dissents, stating that there is no such sexual variation of pronotum (as described in key and shown in figs. 10 and 13) in any other Isometopid or Mirid.

brownish-yellow tinged with grayish fuscous, thickly beset with short procumbent whitish hairs. Elytra, except membrane, shagreened. Length, 2 mm.

Described from a single male taken July 27 near Paris, Va., on the eastern slope of the Blue Ridge Mts. Not recorded elsewhere.

Family XXVII. MICROPHYSIDÆ Reuter, 1884, 4, 169.

Very small depressed oblong (male), broadly oboval (female) species, having the head porrect, inserted in thorax to eyes; antennæ 4-jointed; beak either 4-jointed, the basal joint very small, or 3-jointed; ocelli present; elytra with margins broadly flattened, the venation as in fig. 2;⁷⁶ elytra with a cuneus; inner wings without a hamus, the apical vein with apex forked as in fig. 3; tarsi 2-jointed.

The family is a small one, fewer than 20 species, representing four genera, being known. The principal literature treating of it is by Reuter, 1884; McAtee & Malloch, 1924; Bergroth, 1925. One genus, represented by a single species, occurs in our territory.

I. MALLOCHIOLA Bergroth, 1925, 160.

Species possessing the family characters above mentioned and having the head much narrowed in front of eyes; ocelli nearer to eyes than to each other; beak 3-jointed, the relative length of joints as in fig. 1; antennæ 4-jointed, joint 1 scarcely reaching tip of tylus, 2 slightly longer than 3, 4 longest; pronotum transverse, sides rounded in front of middle, hind margin truncate, front one broadly concave; elytra entire, membrane with a single small cell (fig. 2); hind wing with venation as in fig. 3.

635 (—). MALLOCHIOLA GAGATES (McAtee & Malloch), 1924, 71.

Female—Broadly oboval, subdepressed. Black, shining; membrane of elytra slightly paler than corium; antennæ, legs and genital segment with short pale hairs. Hind portion of pronotum minutely shagreened. Scutellum with very fine transverse strigæ and an ill-defined broad central elevation. Apex of abdomen subtruncate. Hind tibiæ about one-half longer than femora, distinctly curved. Length, 1.2 mm. (Pl. VIII, fig. 2).

Recorded only from Plummer's Island, Md., District of Columbia and Tampico, Mexico. The male is not as yet known.

⁷⁶The figures cited in this family refer to part of those on Plate VIII.

Family XXVIII. TERMATOPHYLIDÆ Reuter, 1884a, 218.

Small elongate-oval species having the head longer than broad, declivent in front, its apex truncate or obtusely pointed; ocelli wanting; beak 4-jointed; antennæ much longer than head, 4-jointed, the last two joints more slender than the basal ones; pronotum trapezoidal, longer than head; elytra entire with the usual divisions including embolium and cuneus present; membrane with a single large cell; cell of inner wings without a hamus; hind femora compressed, movable only inward and outward; tarsi 3-jointed, claws without arolia; stigmas located on the sides of ventrals 2—7. Genital segment of female split at middle and enclosing a sheath for the ovipositor as in the Anthocoridae. The family is a small one comprising only four genera and about 10 species. One genus, represented by a single species, occurs in this country.

I. HESPEROPHYLUM Reuter & Poppius, 1912, 16.

In this genus, mainly characterized as above, the head is much longer than broad, strongly declivent and pointed; eyes glabrous, separated by a narrow groove and, viewed from above, with inner margin concave; tylus long and narrow; beak reaching beyond middle coxæ, joint 1 very short, reaching only middle of eyes, 2 as long as 3 and 4 united; pronotum with basal margin broadly rounded, nearly three times as wide as front one, hind lobe convex, moderately declivent forward, rather thickly and strongly punctate, front lobe not punctate, closely and finely wrinkled, without apical stricture, transverse impression or calli; scutellum flat, smooth, about as long as broad; elytra smooth, surpassing abdomen, cuneus as wide at base as long; membrane with cell almost semicircular; osteolar channel straight, not margined. One species is known.

636 (874). HESPEROPHYLUM HEIDEMANNI Reuter & Poppius, 1912, 17.

Oblong-oval. Black, strongly shining, the front portion of pronotum alone dull; basal half of pronotum and elytra blackish-brown; scutellum yellowish-white, the tip darker; membrane fuscous-brown, strongly iridescent, a paler spot near tip of cuneus; edges of propleura, beak in part, and tibiæ pale yellow, the basal halves of tibiæ somewhat darker. Antennæ with joints 1 and 2 black, 1 reaching slightly beyond middle of tylus, 2 strongly thickened, its sides flattened, slightly longer than pronotum, nearly five times as long as 1, 3 and 4 pale yellow, 4 about as long as 1, slightly longer than 3. Vertex not quite twice as broad as the diameter of the eyes. Length, 4 mm.

The above is a free translation of the original characterization of genus and species. The latter was described from a single female taken on Mt. Washington, New Hamp., and has since been recorded by Barber from Arizona. The type is in the Heidemann collection at Cornell University.

Family XXIX. MIRIDÆ Hahn, 1831, 234 (*Capsidæ* Burm.).

THE LEAF BUGS.

This, the largest family of Heteroptera, comprises species of small or medium size and fragile structure, having the head porrect, usually more or less declivent in front; eyes large, rather coarsely granulated; ocelli absent; antennæ 4-jointed, usually with joints 3 and 4 more slender than 1 and 2, the latter sometimes much thickened; beak 4-jointed, not received in a groove, the first joint as long as or longer than head; pronotum variable in form, usually with two oval, smooth convex areas (*calli*) on front half; scutellum distinct; mesoscutum usually in part exposed; elytra and wings large in proportion to the body, usually surpassing the abdomen and normally separated into clavus, corium, cuneus and membrane, the embolium often not very distinct from the corium; membrane with two basal cells, one larger than the other, the small one sometimes vague or obsolete, otherwise without veins; tarsi 3-jointed, rarely (*Peritropis*) 2-jointed; tarsal claws two, divaricate, often with a pair of slender appendages (*arolia*) between them, these sometimes accompanied by a pair of pseudarolia at the inner base of the claws. Female with genital segments cleft at middle, enclosing the sheath of an ovipositor which is capable of exertion.

The parts of a Mirid used in classification are excellently set forth on the accompanying plate by Knight. Our species vary greatly in form, but are usually elongate or oblong with sides of elytra subparallel, or subovate with sides feebly curved. The male is generally more slender than the female and both sexes are usually macropterous, the male almost always so. The body is generally clothed with fine hairs or pubescence, sometimes also with hair-like scales which are easily abraded. The name *Capsidæ* was used until recently for these leaf bugs. Probably 1,500 or more species are known and new ones are turning up every day. Van Duzee included more than 400

in his Catalogue from America north of Mexico, and Knight and others have since described one hundred or more from the same region. They are, for the most part, plant feeders, but a large number prey upon the young or soft-bodied forms of other insects. Of their habits Knight (1923, 422) has said:

"The predaceous habit is only partially developed in certain species, and thus animal blood serves merely to supplement the sap obtained from particular food plants. Probably the greater number of species are limited to a single host plant, or to a genus of plants, while a very few, such as *Lygus pratensis* Linnæus and *Halticus citri* Ashmead, have a wide range of food plants. Forms which are chiefly predaceous are more frequently found on miscellaneous plants. Even among species which always breed on a single host plant, a general dispersal of individuals usually takes place. Following the time of emergence and mating, individuals of *Tropidosteptes cardinalis* Uhler, *Lopidea staphyleæ* Knight, and others, have been observed to migrate from their host plant to shrubbery in the general vicinity; from thence they doubtless become dispersed over wider territory and to new plants, although in the normal course of their life, eventually returning to suitable growth of the preferred host plant for the purpose of oviposition."

The literature treating of our eastern species of Miridæ is widely scattered. The principal papers used in the preparation of the text which follows are those by Reuter, 1876, 1878, 1904, 1909, 1910, 1912a, 1913; Distant, 1883; Uhler, 1887, 1887a, 1887b, 1890, 1892, 1901; Kirkaldy, 1902, 1902b, 1906, 1906a; Van Duzee, 1916a, 1916b, 1916c, and the numerous papers of Knight cited in the bibliography near the end of this volume. In this work 467 species and numerous varieties of Miridæ are described from the eastern states.

Our eastern species are separated by Knight (1923, 425) into nine subfamilies, the following being a modification of his key so as to bring the sequence (with the exception of the *Orthotylinæ*) as near to that of the Van Duzee Catalogue as possible. In my keys under the subfamily headings I have but rarely, however, used the characters pertaining to the male genitalia in the separation of either genera or species. Students desiring to so use them are referred to Dr. Knight's works, especially the one in the "Hemiptera of Connecticut."

KEY TO EASTERN SUBFAMILIES OF MIRIDÆ.⁷⁷

- a. Arolia present, erect and prominent, approximate at base between the claws (figs. 33—60).
- b. Arolia divergent or divaricate and frequently dilated towards their tips (figs. 55—60).

⁷⁷The figures cited in this key refer to those on Plate X.

- c. Pronotum not constricted near apex to form a ring-like collar, sometimes with a preapical impression, but this never extending over the sides, its lateral margins usually carinate, the carinæ

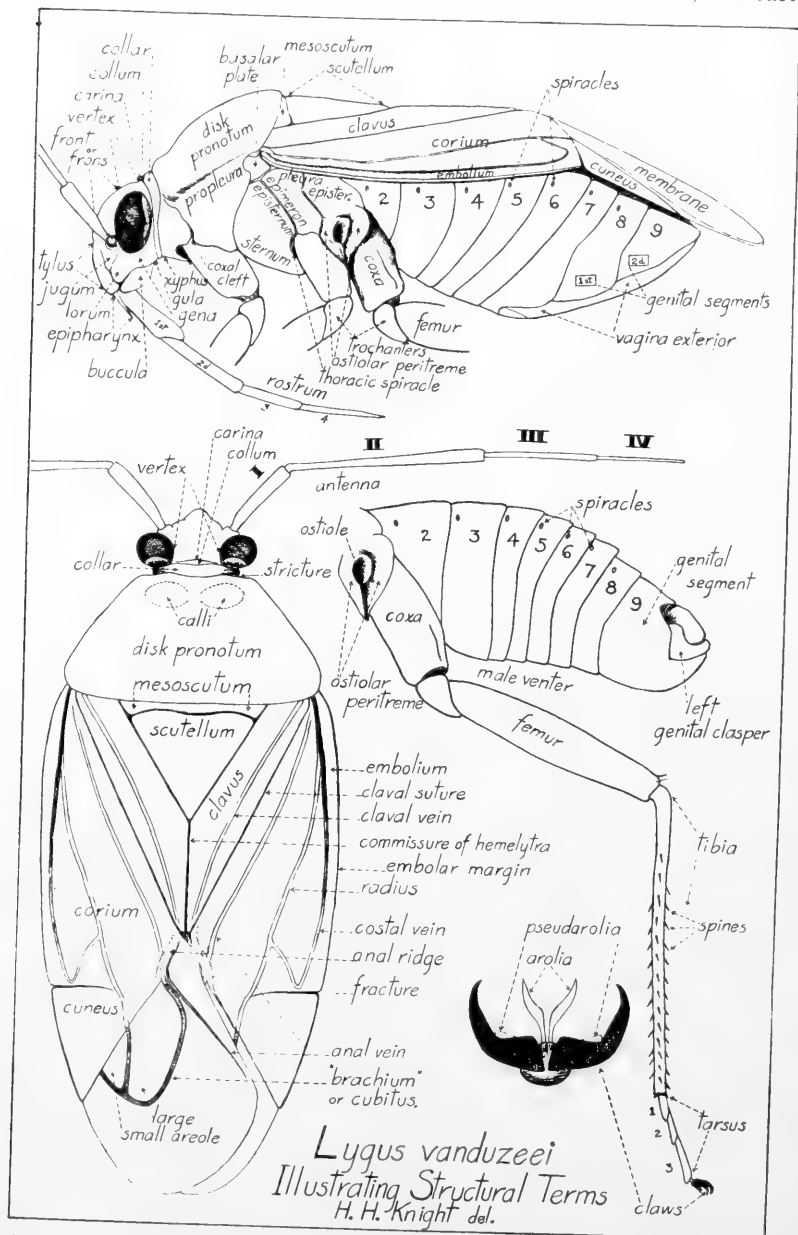


Plate IX. ILLUSTRATING THE STRUCTURAL TERMS USED IN THE CLASSIFICATION OF MIRIDÆ.

(After Knight, Hemiptera of Connecticut).

reaching the front angles; joint 1 of tarsi much longer than and equal in thickness to joint 2; tarsal segments scarcely overlapping at joints and thus very flexible (straw climbers).

Subfamily I. MIRINÆ, p. 665.

- cc. Pronotum constricted near apex to form a distinct collar, the constriction sometimes interrupted above, but always extending over the sides; lateral margins of pronotum frequently carinate, but the carinæ never reaching the front angles; joint 1 of tarsi short, rarely longer than joint 2, if longer (Tribe *Resthenini*) then much thicker than 2; tarsal segments with tips overlapping the joints, thus practically inflexible (leaf walkers).

Subfamily II. CAPSINÆ, p. 681.

- bb. Arolia not divergent or divaricate, but converging toward tips (figs. 33—54); pronotum without a collar.

Subfamily III. ORTHOTYLINÆ, p. 796.

- aa. Arolia absent, or present but bristle-like in form (figs. 25—32); sometimes difficult to distinguish from hairs on the tarsus.

- d. Last tarsal joint swollen, always thicker than the one preceding (fig. 22); tibie destitute of spines; loræ confluent with the genæ; pseudarolia very large, united to the claws along their inner curve (figs. 22—24).

Subfamily IV. BRYOCORINÆ, p. 866.

- dd. Last tarsal joint slender; tibie usually finely but distinctly spinose; loræ usually distinct from genæ; pseudarolia not as above.

- e. Pronotum with apical third convex, rounded in front and prolonged forward as a hood-like projection above the base of the vertex; stricture of the usual collar visible only at the sides from which an impressed line extends inward to behind the calli.

Subfamily V. CLIVINEMINÆ, p. 876.

- ee. Pronotum without an apical hood above the base of vertex.

- f. Pronotum constricted near apex to form a collar, this sometimes vague above at middle, but distinct on sides.

- g. Tarsal claws simple and slender, rarely widely spread (figs. 25, 26); tibie weakly spinose, usually long and tapering apically, sometimes greatly shortened in which case the basal joint of tarsi is unusually long, the head transverse and eyes strongly protruding.

Subfamily VI. CYLAPINÆ, p. 876.

- gg. Tarsal claws thick, either sharply bent (fig. 21) or broadly curved (fig. 27), or more sharply curved and cleft or lobed within near base (figs. 28—32).

- h. Body not elongated; claws usually cleft near base (figs. 28—32); arolia bristle-like; e'lytra not hyaline or glassy.

Subfamily VII. DERÆOCORINÆ, p. 882.

- hh. Body usually elongated, often linear; claws usually sharply bent, not cleft near base (figs. 18—21); elytra often hyaline or glassy, sometimes with a sharply defined inverted Y-shaped red or fuscous mark.

Subfamily VIII. DICYPHINÆ, p. 905.

- ff. Pronotum not constricted to form a collar; sometimes with a somewhat flattened apical collar, then the abdomen constricted at base and the claws curved only at extreme tips (figs. 1—17).

Subfamily IX. PHYLINÆ, p. 914.

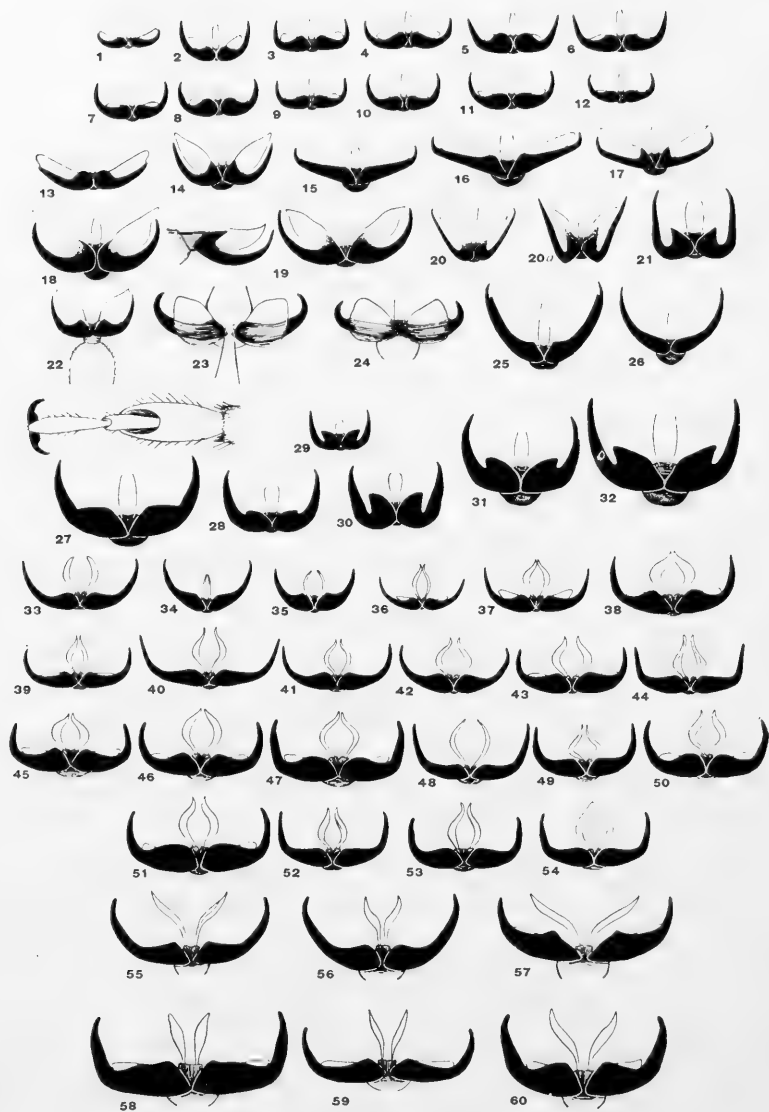


Plate X. TARSAL CLAWS AND AROLIA OF MIRIDÆ.

PHYLINÆ, tribe PHYLINI, figs. 1—12—1, *Chlamydatus associatus* (Uhl.); 2, *Reuteroscopus ornatus* (Reut.); 3, *Lepidopsallus rubidus* (Uhl.); 4, *Microsquamma bohemanii* (Fall.); 5, *Rhinocapsus vanduzeei* Uhl.; 6, *Criocoris saliens* (Reut.); 7, *Psallus ancorifer* (Fieb.); 8, *Lepidopsallus minusculus* Kngt.; 9, *Campylomma verbasci* (Meyer); 10, *Plagiognathus obscurus* Uhl.; 11, *Plagiognathus annulatus* Uhl.; 12, *Microphyllellus modestus* Reut. PHYLINÆ, tribe ONCOTYLINI, figs. 13—14—13, *Lopus decolor* (Fall.); 14, *Macrotylus scyrtallatus* (Prov.). PHYLINÆ, tribe HALLODAPINI, figs. 15—17—15, *Telcorninus darisi* Kngt.; 16, *Orcetoderus obliquus* Uhl.; 17, *Coquillettia mimetica* Osb. DICYPHINÆ, figs. 18—21—18, *Macrolophus separatus* (Uhl.); 19, *Dicyphus agilis* (Uhl.); 20, *Dicyphus discrepans* Kngt.; 20a, *Dicyphus famelicus* (Uhl.); 21, *Hyaliodes vitripennis* (Say). BRYOCORINÆ, figs. 22—24—22, *Monalocoris flicis* (Linn.); 23, *Pycnoderes dilatatus* Reut.; 24, *Sirconotus insignis*

Subfamily I. MIRINÆ Reuter, 1910, 128, 155.

Species above the medium in size and of an elongate form having the head porrect, its front portion usually strongly declivent; pronotum longer than wide, narrowed in front, impressed above near apex but without a distinct collar, the lateral carinæ entire; scutellum large, triangular, with basal half usually swollen and in part concealed; elytra often dimorphic, when entire the clavus distinct, corium with a central nervure; membrane usually with only one distinct cell, the smaller one vague or obsolete; cuneus elongate, its suture often indistinct; hind coxæ almost contiguous; hind femora elongate, not much swollen; basal joint of tarsi as long as or longer than the other two united; arolia large, free, often clavate. To this subfamily, as thus characterized, belong ten of our eastern genera.

KEY TO EASTERN GENERA OF MIRINÆ.

- a. Pronotum widest at the base, not noticeably swollen at the middle.
 - b. Head strongly exserted; eyes placed near its middle at some distance from the front margin of pronotum; median sulcus of vertex short but distinct. I. COLLARIA, p. 666.
 - bb. Head not or only slightly exserted; eyes usually in contact with pronotum or nearly so.
 - c. Pronotum distinctly deeply punctured; hind margin of pronotum truncate or nearly so.
 - d. Joint 1 of antennæ thickly clothed with long pubescent hairs; punctures of pronotum and scutellum deep, closely placed. II. STENODEMA, p. 668.
 - dd. Joint 1 of antennæ with very short pubescence or glabrous; punctures of pronotum and scutellum sparse and deep. III. MESOMIRIS, p. 670.
 - cc. Pronotum impunctate or nearly so.
 - e. Antennal segments, at least the basal one, thickly clothed with rather coarse stiff hairs.

Reut. CYLAPINÆ, figs. 25—26—25, *Cylapus tenuicornis* Say; 26, *Fulvius brunneus* (Prov.). CLIVINEMINÆ, fig. 27—27, *Largidea davisi* Kngt.,—claws and hind tarsus. DERÆOCORINÆ, figs. 28—32—28, *Deræocoris pinicola* Kngt.; 29, *Deræocoris nebulosus* (Uhl.); 30, *Deræocoris ruber* (Linn.); 31, *Eurychilopteryella luridula* Reut.; 32, *Eustictus venatorius* Van D. ORTHOTYLINÆ, figs. 33—54—33, *Labops hesperius* Uhl.; 34, *Semium hirtum* Reut.; 35, *Parthenicus vaccini* (Van D.); 36, *Halticus citri* Ashm.; *Halticus intermedius* Uhl.; 38, *Strongylocoris stygica* (Say); 39, *Orthocephalus mutabilis* (Fall.); 40, *Sericophanes heidemanni* Popp.; 41, *Alepidia gracilis* (Uhl.); 42, *Pilophorus amœnus* Uhl.; 43, *Pseudoxenetes scutellatus* (Uhl.); 44, *Ceratocapsus modestus* Uhl.; 45, *Lopidea robiniae* (Uhl.); 46, *Hadronema militaris* Uhl.; 47, *Ilacora malina* (Uhl.); 48, *Orthotylus flavosparsus* (Sahlb.); 49, *Orthotylus catulus* Van D.; 50, *Orthotylus dorsalis* (Prov.); 51, *Heterocordylus malinus* Reut.; 52, *Mecomma gilvipes* (Stal.); 53, *Reuteria irrorata* (Say); 54, *Diaphnidia pellucida* Uhl. MIRINÆ, figs. 55—56—55, *Pithanus mærkeli* (H.S.); 56, *Stenodema trispinosum* Reut. CAPSINÆ, figs. 57—60—57, *Barberiella apicalis* Kngt.; 58, *Platytyllus insitivus* (Say); 59, *Phytocoris lasiomerus* Reut.; 60, *Lygus vanduzeei* Kngt. (After Knight in Hemiptera of Connecticut).

- f.* Hind margin of pronotum subtruncate; mesoscutum without a deep fovea each side.
- g.* Median longitudinal sulcus of vertex deep, distinct; joint 1 of antennæ as long as pronotum and scutellum united; eyes contiguous with front angles of pronotum; body almost glabrous. IV. MEGALOCERÆA, p. 671.
- gg.* Median sulcus of vertex nearly or quite obsolete; joint 1 of antennæ not longer than pronotum; eyes slightly distant from front angles of pronotum; body clothed with fine long suberect pubescence. V. MIRIS, p. 671.
- ff.* Hind margin of pronotum deeply concavely sinuate; mesoscutum broadly exposed, with a large deep oblique fovea each side and a distinct transverse impressed line behind the foveæ. VI. EIONEUS, p. 673.
- ee.* Antennal segments clothed with very fine pubescence; body nearly glabrous, at most with very short pubescence; hind margin of pronotum deeply concave, leaving the mesoscutum broadly exposed.
- h.* Head long and pointed, its front projecting sharply beyond base of antennæ; median sulcus of vertex deep; basal joint of antennæ not so long and attenuate as in *hh*. VII. TRIGONOTYLUS, p. 674.
- hh.* Head short and flattened, its front scarcely projecting beyond the base of antennæ; median sulcus of head replaced by a broad and shallow basin; basal joint of antennæ slender, curved, thickest near base, then tapering and slightly enlarged at apex. VIII. TERATOCORIS, p. 677.
- aa.* Pronotum distinctly swollen at middle, as wide or wider there than at base.
- i.* Head constricted into a short neck behind the eyes; basal joint of antennæ longer than width of vertex; tylus convex, its base distinct from the front; pronotum extending back to basal angles of elytra. IX. MIMOCEPS, p. 679.
- ii.* Head not constricted behind the eyes; basal joint of antennæ shorter than width of vertex; tylus flattened, merged with the front; pronotum not extending back to basal angles of elytra. X. PITHANUS, p. 680.

I. COLLARIA Provancher, 1872, 79.

Elongate, slender, pubescent species having the head porrect, prolonged forward, its front declivent; vertex with a median longitudinal groove and a transverse impression between base of eyes, thence feebly narrowed backward into a neck; tylus prominent, strongly shining; antennæ about as long as body, joint 1 stoutest, as long as or slightly longer than width of head, 2 about three and one-half times as long as 1, 3 and 4 more slender, the former one-third or more the longer; beak

reaching hind coxæ, its basal joint stoutest; pronotum subcampanulate, the front lobe subcylindrical, impressed and constricted above to form the semblance of a collar, the constriction not cutting the lateral carinæ, the calli prominent, hind lobe finely and closely punctate, its basal margin straight, and disk with an oval opaque, velvety-black spot near each hind angle; elytra with sides subparallel, membrane usually surpassing abdomen, its cell longer than the cuneus. Other characters as in key and under subfamily heading. Four species occur in North America, three in our territory.

KEY TO EASTERN SPECIES OF COLLARIA.

- a. Hind lobe of pronotum and scutellum black; calli of pronotum strongly convex, nearly as high as base of pronotum. 637. MEILLEURII.
- aa. Hind lobe of pronotum and scutellum brown or fuscous; calli much less convex.
- b. Tibiæ with numerous short bristle-like hairs; femora very indistinctly dotted with brown; longer (6.6—7 mm.) and more robust. 638. OCULATA.
- bb. Tibiæ thickly hirsute with long slender hairs; femora distinctly dotted with black; shorter (not over 6 mm.) and more slender. 639. EXPLICATA.

637 (875). *COLLARIA MEILLEURII* Provancher, 1872, 79.

Elongate, slender, subcylindrical. General color black, more or less shining; elytra usually in great part dull straw-yellow, the apex of corium and the clavus in part fuscous; sometimes wholly fuscous except the costal margins; femora, tibiæ, beak, except tip, and extreme base of antennæ, dull yellow, the femora with small blackish-brown dots; tarsi and antennæ fuscous, the basal joint of latter often paler; ventrals sometimes margined and spotted on the middle with yellow. Length, 6—7 mm.

Lake and Marion counties, Ind., June 19—July 9; frequent on grasses growing in the low alluvial soil of the White River bottoms. Its known range is northerly, extending from Ontario and New England west to Michigan and Illinois. Usually common where found on grasses in low moist grounds. In some specimens the elytra reach only to fifth dorsal.

638 (876). *COLLARIA OCULATA* (Reuter), 1876, 61.

Form of *meilleurii*, averaging slightly smaller. General color dull brownish-yellow; head, joints 2—4 of antennæ, front lobe of pronotum and abdomen tinged with reddish or fuscous; hind lobe of pronotum and scutellum dull brown, each with a narrow paler median line; elytra chiefly brown, often tinged with fuscous, the embolium paler; legs and

beak dull yellow, the tarsi darker and femora vaguely spotted with small brown dots; basal joint of antennæ testaceous, darker at base. Structural characters as above given. Length, 6.2—7 mm.

Frequent throughout southern Indiana, less so in the northern counties; May 12—Sept. 25. Dunedin and Ft. Myers, Fla., March 4—28 (*W. S. B.*). Recorded from six other stations in Florida. Occurs in Indiana mainly on grasses growing in dry soils along roadsides, railway embankments and other waste places; sometimes on sedges and grasses along swales in upland woods; also frequent on the low herbage of the sand flats in the dune region. Ranges from Quebec and New England west to Iowa and Kansas and southwest to Florida and Texas. The velvety-black spots on the brown background of pronotum are much more prominent than in *mcillecurii*.

639 (877). *COLLARIA EXPLICATA* Uhler, 1887, 230.

Shorter and more slender than *oculata*. Pale brownish yellow, more or less tinged with fuscous; cheeks and tylus blackish-piceous; joint 1 of antennæ reddish-brown, the extreme base and some dots on under side blackish, 2—4 fuscous; basal lobe of head, pronotum, clavus and inner half or more of corium usually tinged with dark fuscous; collar and median carina of pronotum, median line and base of scutellum, embolium and sternum, pale straw-yellow; ventrals tinged with fuscous. Basal lobe of head and scutellum finely transversely wrinkled; of pronotum finely, closely, unevenly punctate. Length, 5.5—6 mm.

Dunedin and Ft. Myers, Fla., Feb. 21—April 25 (*W. S. B.*). Jamaica, W. I. (*Gerhard*). Described from Cuba and San Domingo. Recorded from Biscayne Bay, Fla. The Dunedin specimens were swept from prickly sida, *Sida spinosa* L., a semi-tropical introduced weed.

II. *STENODEMA* Laporte, 1832, 40.

Elongate, slender, greenish or straw-yellow species having the head porrect, rather long and pointed, inserted in thorax to eyes, the vertex with a short median groove; joint 1 of antennæ stout, slightly curved, thickly clothed with bristly hairs, 2—4 gradually more slender, 3 about one-half the length of 2, slightly longer than 4; beak reaching middle coxæ, its basal joint scarcely longer than head; pronotum trapezoidal, without transverse constriction, feebly narrowed from base to apex, its lateral carinæ distinct, entire, disk finely and closely punctate and with a faint smooth median longitudinal carina, this continued to apex of scutellum; elytra entire, sur-

passing abdomen; membrane with two distinct cells, the larger one longer than the cuneus.

Two species occur in our territory. A third, the *Stenodema virans* (Linn.), a common European species, is included by Van Duzee from "N. Amer.," without definite locality. Knight (1922, 288) states that it occurs from Colorado and Montana westward.

KEY TO EASTERN SPECIES OF STENODEMA.

- a. Hind femora armed beneath near apex with three spines, the posterior one very short; antennæ dull yellow. 640. TRISPINOSUM.
- aa. Hind femora unarmed; antennæ in great part reddish. 641. VICINUM.

640 (882). *STENODEMA TRISPINOSUM* Reuter, 1904, 4, 8.

Elongate-oval, slender. Color a nearly uniform pale green fading to straw-yellow; pronotum sometimes with two vague lateral stripes and a blotch on basal half fuscous; corium rarely with a faint fuscous stripe extending to apex of membrane; hind femora indistinctly dotted with brown; mesosternum, tarsi and a stripe along the sides of under surface often fuscous. Structural characters as under generic heading. Length, 6.8—7.5 mm.

Common throughout southern Indiana, less so in the northern counties, May 31—Oct. 21. Occurs on grasses in meadows and along roadsides, usually in dry soil. One specimen taken on juniper has a dusky stripe the full length of corium and membrane and four spines on hind femora. This is a palæ-arctic European species whose known range in this country is northern, extending from Quebec and New England west across the continent to British Columbia and California. Not recorded south of New Jersey except from Texas, probably in error, by Uhler (1876, 316) as *Brachytropis calcaratus* Fall.

641 (883). *STENODEMA VICINUM* (Provancher), 1872, 77.

Form of *trispinosum*, averaging slightly larger. Color much as there; pronotum with a narrow pale median stripe, often bordered each side by a wide fuscous one, extending from vertex back to end of scutellum; male with clavus and inner half of corium usually fuscous to blackish; antennæ in fresh specimens of a roseate hue, the basal joint often paler. Hind femora more slender than in *trispinosum* and usually without dark dots. Length, 7—7.5 mm. (Fig. 164).

Lake, Kosciusko and Marion counties, Ind., June 19—Oct. 26; swept from tall grasses along a railway embankment and from low herbage along the margins of woods (H. S. B.). Chicago,

Ill., July—August (*Gerhard*). Sherborn, Mass., May 22 (*Frost*). Various localities in North Carolina, July (*Brimley*). Ranges from Quebec and New England to the Pacific; occurring usually

in abundance in June and July on grasses in low moist meadows, and hibernating as imago. Previously recorded mostly as *Miris instabilis* Uhler or *M. affinis* Reut., both of which are synonyms.

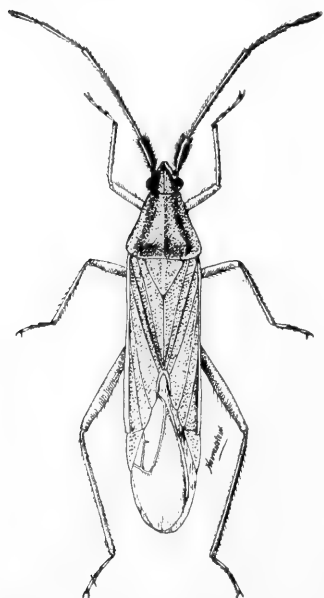


Fig. 164. *Stenodema vicinum* (Prov.), X 7. (After Lugger).

III. MESOMIRIS Reuter, 1909, 4.

Oblong suboval species having the head porrect, not longer than broad, about one-third narrower than base of pronotum, inserted in thorax to eyes, vertex with a deep median impressed line, tylus subvertical; beak reaching middle coxæ, its first joint not surpassing base of head; antennæ subglabrous, longer than body, joint 1 stout, elongate cylindrical, feebly curved, subequal in length to 4, 2 three times as long as 1, 3 about one-

fourth shorter than 2; pronotum trapezoidal, as wide at base as long, sides feebly sinuate, basal half convex, sparsely and deeply punctate; scutellum about as long as head, transversely strigose, sparsely punctate; elytra slightly surpassing abdomen, sides feebly rounded, membrane with two distinct cells. One species is known.

642 (889). MESOMIRIS CURTULUS Reuter, 1909, 5.

Brownish-yellow or dark brown, often with a strong reddish tinge, margins of elytra paler; pronotum with narrow median carina extending back to tip of scutellum and edge of side margins yellow; legs and antennæ dull red; claval vein often fuscous. Pronotum distinctly, deeply, unevenly punctate, the carinæ of its side margins sharp, entire, reaching eyes. Hind femora unarmed. Length, 6—6.5 mm.

Staten and Long Islands, N. Y., August (*Davis*). Barnegat Bay District, N. J., Aug. 27 (*Gerhard*). Described from Maryland, where it occurs on wild rice. Known from southern New England west to Pennsylvania. Resembles *Stenodema vicinum*,

but readily distinguished by the shorter head and the very short, fine pubescence of the antennal segments.

IV. MEGALOCERÆA Fieber, 1858, 301.

Elongate linear pale greenish species having the head one-third longer than broad, nearly as long as pronotum; beak reaching or surpassing hind coxæ, its first joint longer than head; antennæ longer than body; hind femora moderately swollen, and subcylindrical throughout their length. Four species are recorded from North America, one from the eastern states.

643 (—). MEGALOCERÆA RECTICORNIS (Geoffroy), 1785, 209.

Elongate, slender. Greenish-yellow; pronotum brownish or brownish-yellow, the margins and median carina paler; scutellum with a brownish tinge, its median line yellow; membrane grayish, tinged with purplish, slightly iridescent, the inner cell and apex paler, veins whitish; legs greenish-yellow, the hind ones almost twice as long as middle pair, clothed with short blackish hairs; tips of tibiæ brownish; tarsi and claws fuscous. Antennæ brownish-yellow, joint 1 as long as pronotum and scutellum united, both it and basal two-thirds of 2 clothed with short black hairs; 2 and 3 subequal, each twice as long as 1; 4 one-third the length of 3. Pronotum with front margin of disk flattened, lateral carinæ prominent, not reaching front or hind angles; calli large, low, separated by a rather deep impression; hind lobe of disk minutely rugosely punctate. Length, 8—8.5 mm.

Chiltern Hills, England (*British Mus. Coll.*) A palæarctic European species taken by Fracker at Madison, Wis., June 27, on foxtail, *Chamæropsis glauca* L., and known in this country only from there. In England it is not uncommon in midsummer on plants growing along hedge rows.

V. MIRIS Fabricius, 1794, 183.

Elongate species of medium size having the head as wide as long, slightly exserted, porrect, its front half moderately declivent, vertex with a transverse depression just behind eyes; beak passing middle coxæ, its basal joint surpassing base of head; eyes prominent; pronotum trapezoidal, as wide at base as long, disk minutely rugose, not punctate, feebly constricted both before and behind the calli, the latter quite prominent; scutellum smooth; mesoscutum strongly convex, partly exposed; elytra dimorphic, usually entire, surpassing the abdomen; membrane with but one distinct cell, this one-half longer than cuneus. Two species occur in eastern North America.

KEY TO EASTERN SPECIES OF MIRIS.

- a.* Antennæ longer than body, joints 1 and 2 in female not stouter than in male; general color brownish-yellow with black or fuscous markings; brachypterous forms with membrane rudimentary. 644. DOLOBRATUS.
- aa.* Antennæ slightly shorter than body, joints 1 and 2 in female distinctly stouter than in male; general color brownish-pink, male, pale pink, female; brachypterous forms wholly devoid of membrane. 645. FERRUGATUS.

644 (879). *MIRIS DOLOBRATUS* (Linnaeus), 1758, 449.

Elongate, feebly tapering from base of elytra toward both ends. Color variable, either dull brownish-yellow with black or fuscous markings, or largely black with elytra paler. In the darker forms, usually the males, the head, antennæ, legs and under surface except sides of abdomen, are black, thorax with median stripe and lateral edges dull yellow; scutellum black, its apical half paler; elytra dull reddish-brown or brownish-yellow with clavus and corium often tinged with fuscous. In the paler forms, usually females, the black parts above mentioned are dull brownish-yellow, the only black marks being a forked median stripe on head; a broad stripe each side of pronotum extending onto mesoscutum, a stripe each side of under surface, some scattered dots on femora and a spot on mesosternum. In both forms the tarsi and apical half of beak are fuscous. All possible variations occur between the extremes of dark and pale forms. Antennæ with joint 1 stout, subcylindrical, feebly curved, as long as pronotum, 2 more slender, more than twice as long as 1, 3 one-half the length of 2, twice that of 4. Other characters as under generic heading. Length, 7—9 mm.

This species is known as the "meadow plant-bug," and in late spring and early summer it is the most common Mirid throughout Indiana, occurring by myriads in pastures, meadows and waste places on blue-grass, timothy and other forage grasses, and doubtless doing much damage to them. In central Indiana it winters in the egg stage and the nymphs are very common in late April and May, the first adults maturing about May 20. Osborn (1918) has given a full account of its life history. A brachypterous form, mostly females, in which the elytra reach only the fifth dorsal, is common. It is an introduced palæarctic European species ranging in this country from Quebec and New England west to British Columbia and Minnesota. Not recorded, though doubtless occurs, south of Maryland, New Jersey and Kentucky.

645 (880). *MIRIS FERRUGATUS* Fallen, 1807, 107.

Male.—Form and size of *dolobratulus*. Head black with a stripe each side of vertex and a narrow line on middle of tylus yellow; collar of

pronotum black, with a median yellowish spot, disk with basal two-thirds pinkish-brown, the sides and median triangular spot yellowish; scutellum black with yellow median line, a reddish-brown spot each side of base; elytra pinkish-brown, inner margin of clavus often blackish, costal margin yellow; membrane grayish, inner nerve piceous, the others yellowish; legs brownish-yellow, clothed with short black hairs; femora with black dots more or less confluent, tarsi fuscous. Antennæ dull brownish-yellow thickly beset with short stout piceous hairs, joint 1 as long as pronotum; 2 cylindrical, two and a half times as long as 1, its middle third often reddish-brown; 3 and 4 slender, 3 three-fourths the length of 2, twice as long as 4. *Female*—Head yellow, vertex usually with two dark lines each side of the yellow center, a piceous stripe behind each eye; pronotum with collar piceous, basal two-thirds of disk pinkish, sides and middle of disk pale yellowish; scutellum yellowish, the basal angles pink, margins blackish; elytra and legs as in male. In the brachypterous form the elytra are pink and reach only to third dorsal, their tips divergent and narrowly rounded. Length, 7.5—8 mm.

Camberwell, England (*British Mus. Coll.*). A palæarctic European species recorded in this country only from Quebec and Alaska. In England the brachypterous form is common on grasses and other herbage along the margins of fields, the macropterous one rather scarce.

VI. EIONEUS Distant, 1893, 416.

Elongate, slender species having the head longer than its width across eyes, inserted in thorax to eyes; tylus subvertical, longer than cheeks, the triangular front of head prolonged over its base; vertex with a short median longitudinal groove; antennæ slender, longer than body, joint 1 and basal half of 2 thickly beset with stiff bristle-like forward inclined hairs; pronotum one-fourth longer at middle than wide at base, lateral margins feebly converging from the base, slightly sinuate near apex, their carinæ sharp, percurrent; front margin feebly concave, hind one deeply and broadly so; mesoscutum broadly exposed and with a large obliquely set funnel-shaped fovea each side, this followed by a deep sharp cut transverse line; elytra entire, their margins subparallel; hind femora reaching apex of membrane; hind tibiæ thickly beset with long slender black setæ.

This genus is closely allied both to *Miris* and *Trigonotylus*. From the former it differs by the concave hind margin of pronotum, peculiar structure of mesoscutum and lack of long pubescence on body; from the latter by the thickly pilose basal

joints of antennæ, and long setæ of hind tibiæ. Two species are known, one from Mexico and Central America, the other from Florida.

646 (—). *EIONEUS GUTTICORNIS* sp. nov.

Elongate, slender, sides subparallel. Pale greenish-yellow; head and pronotum each with three narrow vague percurrent reddish stripes, the median one continued back to apex of scutellum and on both it and pronotum with a slender yellowish carina along its middle; legs greenish-yellow, femora with scattered vague brownish dots, tarsi fuscous, hind tibiæ and basal joint of hind tarsi red; under surface with a reddish stripe extending from below eyes along the side margin to fifth ventral; mesosternum and coxæ with two similar stripes. Antennæ as long as body, joint 1 and basal half of 2 greenish-yellow, thickly flecked with reddish dots and beset with grayish hairs; 1 stout, cylindrical, almost as long as head and pronotum united; 2 two-thirds longer than 1, distinctly tapering from base to apex; 3 and 4 more slender, finely pubescent, 3 dull yellow, one-half longer than 2; 4 brownish, one-fourth the length of 3. Beak reaching hind coxæ, its first joint shorter than head. Pronotum smooth, its front half with two low oblong calli connected by a raised line at middle. Other characters as under generic heading. Length, 7.8 mm.

Described from a single female, taken near Dunedin, Fla., Nov. 21, by sweeping the grasses of a tidal marsh along the bay front. The *E. bilineatus* Dist. differs in having the first antennal dark ochraceous without reddish dots; hind tibiæ and base of hind tarsi bright castaneous, tips of all tibiæ black and apex of scutellum nodulose.

VII. *TRIGONOTYLUS* Fieber, 1858, 302.

Small elongate very slender species, usually green or greenish-yellow in hue, having the head porrect, distinctly longer than wide, inserted in thorax to eyes; tylus compressed, elevated above the cheeks; antennæ longer than body, joint 1 as long as or longer than head, finely pubescent, 2 about one-fourth longer than 3, the latter nearly three times longer than 4; beak reaching middle coxæ, first joint reaching base of head; pronotum trapezoidal, slightly wider at base than long, the carinæ of its side margins prominent, disk smooth or nearly so, its hind margin broadly concave; mesoscutum broadly exposed and with a deep fovea each side of base; elytra entire, surpassing abdomen, large cell of membrane entirely hyaline; tibiæ finely pilose; femora feebly swollen toward base. Seven species occur in North America, all in our territory.

KEY TO EASTERN SPECIES OF TRIGONOTYLUS.

- a. Head not distinctly elongated between the eyes and base of antennæ; eyes usually prominent, oval or nearly round.
- b. Hind tarsi and tips of hind tibiæ black. 647. TARSALIS.
- bb. Tarsi usually reddish, tips of hind tibiæ not black.
- c. Joint 1 of antennæ not or but slightly longer than head.
- d. Basal joint of hind tarsi slightly longer than remaining two united; pronotum usually with longitudinal fuscous stripes; antennæ reddish. 648. RUFICORNIS.
- dd. Basal joint of hind tarsi slightly shorter than remaining two united; pronotum without fuscous stripes.
- e. Head and pronotum each with three roseate stripes, those of head uniting at apex of tylus; antennæ reddish at base, fuscous toward apex. 649. PULCHER.
- ee. Head, pronotum and antennæ uniformly pale. 650. BREVIPES.
- cc. Joint 1 of antennæ one-half or more longer than head; pronotum with three or four pale orange or fuscous stripes, these sometimes prolonged backward onto scutellum and elytra.
- f. Larger, length 6.2—7.5 mm.; antennæ greenish-yellow, joint 4 dusky; eyes large, elongate-oval. 651. UHLERI.
- ff. Smaller, length less than 5 mm.; antennæ in great part red; eyes small, rounded. 652. LONGICORNIS.
- aa. Head distinctly elongated between front margin of eyes and base of antennæ, the sides at this point parallel; eyes not prominent, distinctly longitudinal; antennæ often pinkish. 653. CONFUSUS.

647 (893). TRIGONOTYLUS TARSALIS (Reuter), 1876, 60.

Color a nearly uniform pale greenish-yellow, fading to dull straw-yellow. Antennæ from middle of joint 2 to apex of 4 often reddish; joint 3 scarcely shorter than 2. Pronotum minutely transversely strigose, a distinct impression just in front of middle of disk. Elytra feebly tapering from middle to their conjointly rounded tips. Length, 5.5—6.2 mm.

Argo and Chicago, Ill., June 14—July 24; taken at light and by sweeping (*Gerhard*). Doubtless occurs in northern Indiana. Ranges from southern New England west to North Dakota and Manitoba and southwest to Kansas and Texas. Breeds on slough grass (*Spartina*).

648 (890). TRIGONOTYLUS RUFICORNIS (Geoffroy), 1785, 209.

Pale green fading to greenish-yellow; antennæ dull red throughout; pronotum often with four vague fuscous stripes with a narrow pale line between the two median ones; tarsi reddish, the claws black. Pronotum more widened behind than in our other species. Length, 5.5—6 mm.

Marion Co., Ind., June 5—Aug. 4; swept in some numbers from grasses and wild rye along a railway embankment (*W. S. B.*). Whiteface Mt., N. Y., July (*Davis*). Chicago, Ill., and St. Anthony Park, Minn., July (*Gerhard*). A European

species ranging in this country from Quebec and New England west to Alaska, Kansas and Colorado. Not recorded south of Maryland. Uhler (1872, 409) says that in Massachusetts it abounds upon the salt marshes near the coast.

649 (891). *TRIGONOTYLUS PULCHER* Reuter, 1876, 59.

Pale green or greenish-white; head and pronotum with roseate stripes as in key, these often vague in dried specimens, in fresh ones usually prominent, the median one extending to apex of scutellum and with a narrow yellowish line along its middle; elytra each with three similar roseate lines along the principal veins, the lateral ones often reaching back to end of cuneus; femora with similar roseate stripes; third joint of tarsi and claws fuscous. Length, 4.5—5 mm.

Dunedin, Moore Haven and Cape Sable, Fla., Nov. 16—March 7 (*W. S. B.*). Agricultural College, Miss. (*Wcd*). Recorded from nine additional Florida stations. Frequent about Dunedin in late autumn on goldenrod and tall grasses along the margins of ponds. Described from Texas. Recorded by Van Duzee as ranging from Maine to Colorado and south to Florida and Texas, but the northern records probably refer to *uhleri* as *pulcher* is not included in either Parshley's New England List or the "Hemiptera of Connecticut."

650 (892). *TRIGONOTYLUS BREVIPES* Jakovlef, 1880, 215.

Form and size of *pulcher*. Color a nearly uniform pale green fading to greenish-yellow; antennæ often with a reddish tinge; under surface (in dried specimens) pale brown, the hind margin of each ventral paler; tarsi tinged with reddish, the apical half of third joint and claws fuscous. Length, 4.8—5.2 mm.

Dunedin, Fla., April 21. Taken in numbers from a fine grass growing on the mucky borders of a pool on Hog Island. No previous definite station record for that State. A cosmopolitan subarctic species, known heretofore in this country from Connecticut, Maryland and California; also from Jamaica and Cuba.

651 (894). *TRIGONOTYLUS UHLERI* (Reuter), 1876, 60.

Pale green, fading to greenish-yellow; pronotum and elytra with rosaceous or fuscous stripes as in key, these prolonged backward to cuneus, but often subobsolete in dried specimens; antennæ greenish-yellow, the fourth joint dusky; ventrals and tarsal claws fuscous. Length, 6.2—7.5 mm.

Staten Island, N. Y., and Dennisville, N. J., June 24—Sept. 6 (*Davis*); taken on salt meadows. Known only from New Eng-

land, New York and New Jersey. It is our largest species and when fresh a very handsome one.

652 (—). *TRIGONOTYLUS LONGICORNIS* sp. nov.

Dark green fading to greenish-yellow; head in part dull yellow; pronotum with three vague fuscous stripes, the median one extending to tip of scutellum and enclosing a narrow pale median line; hind tibiæ and basal joints of tarsi red, third tarsal and claws blackish. Joint 1 of antennæ red, almost as long as head and pronotum united; 2 red, yellowish toward apex, scarcely twice the length of 1; 3 yellowish at base, red toward apex, slightly longer than 2; 4 red, two-fifths as long as 3. Length, 4.5—4.7 mm.

Dunedin, Fla., March 25—April 4; swept from dense clumps of coarse wire-grass along ditches near bay front. Resembles *pulcher*, but antennæ more reddish, with first joint twice as long.

653 (895). *TRIGONOTYLUS CONFUSUS* Reuter, 1909, 6.

Pale green; legs, and often the antennæ, concolorous, hind tibiæ and tarsi reddish; head with median line and pronotum with four percurrent lines greenish-fuscous; membrane whitish, the smaller cell coriaceous, greenish. Joints 1 and 3 of antennæ subequal in length, 1 rather stout, attenuate toward apex, as long as pronotum and half of head; 2 nearly twice as long as 1, 4 more slender, shorter than 1. Pronotum with base but little wider than that of head, the transverse impression located slightly behind the middle. Length, 4.3—5 mm.

Described from Paincy Point and Bay Ridge, Md.; not recorded elsewhere. Similar in size and color to *brevipennis*, but legs and first antennal longer and base of pronotum narrower.

VIII. *TERATOCORIS* Fieber, 1858, 302.

Elongate or oblong, finely pubescent species having the head short, porrect, wider than long, slightly exserted, vertex transversely impressed; eyes prominent; antennæ as long as or longer than body, joint 1 as in generic key, 2 much more slender, as long as clavus, 3 one-half longer than 4, both very slender; beak reaching middle coxæ; pronotum narrowed toward apex, not declivent in front, its apical constriction distinct, but not cutting the marginal carinæ; elytra entire or abbreviated; membrane with the large cell wholly or in part opaque-punctate, confluent with the cuneus; basal joint of hind tarsi much longer than second. Three of the four known American species occur in our territory.

KEY TO EASTERN SPECIES OF TERATOCORIS.

- a.* Upper surface in part fuscous or reddish-fuscous, basal angles of pronotum and margins of elytra paler; eyes very prominent; length, 5.5—6 mm. 654. DISCOLOR.
- aa.* Pale greenish-yellow or straw color; pronotum trapezoidal; eyes of moderate size.
 - b.* Smaller, length 4—4.5 mm.; hind tibiæ dull yellow. 655. HERBATICUS.
 - bb.* Larger, length 5.7—6.8 mm.; hind tibiæ red. 656. PALUDUM.

654 (896). *TERATOCORIS DISCOLOR* Uhler, 1887b, 68.

Head, pronotum except side margins, scutellum, clavus, inner apical half of corium and base of membrane, fuscous, usually more or less tinged with reddish; two small vague spots on vertex, embolium, base of corium, middle of ventrals 1—4 and coxæ usually pale dull yellow; legs and joints 1 and 2 of antennæ reddish; remainder of antennæ and under surface, except base of ventrals, fuscous. Disk of pronotum with apical and median constrictions prominent, the apical fourth and basal third finely transversely rugose, marginal carinæ distinct. Scutellum minutely transversely rugose, its apex with a slight median carina. Elytra finely pubescent, slightly widened from base to middle, then feebly narrowed to apex. Length, 5.5—6.2 mm.

Lake Co., Ind., and Chicago, Ill., June 8—July 4 (*Gerhard*). East New York, June 4 (*Davis*). Ranges from Quebec and New England west to South Dakota and Colorado and south to Missouri. Hussey found it common in July in the *Juncus-Equisetum* zone at the edge of a marsh in Berrien Co., Mich. Knight states that it occurs on sedges and is frequently attracted to light.

655 (897). *TERATOCORIS HERBATICUS* Uhler, 1887b, 67.

Elongate, slender, sides subparallel, male; wider, more oval, female. Pale greenish- or straw-yellow; male with a narrow black stripe extending from base of tylus to tip of scutellum; antennæ, knees and tarsi tinged with brownish, femora with scattered dark dots. Antennæ reaching tips of elytra, gradually more slender toward tips. Pronotum trapezoidal, side margins of front portion strongly reflexed, humeral angles prominent; hind portion depressed, sparsely punctate. Elytra narrow with sides parallel, male, wider, more curved, the costal margin more reflexed, female; corium and clavus vaguely wrinkled, sparsely punctate, male, distinctly scabrous, female. Genital plate of male beset with stout erect bristles. Length, 4—4.5 mm.

Described from Ungava Bay and Hopedale, Labrador. Known also from Norway and Sweden.

656 (—). *TERATOCORIS PALUDUM* Sahlberg, 1871, 291.

Elongate, slender, sides subparallel. Pale green fading to straw-

yellow; joints 1 and 2 of antennæ in great part pinkish, 3 and 4 fuscous; knees and hind tibiæ pinkish-red. Pronotum with constrictions less deep than in *discolor*, the median area of disk with a distinct impression. Apex of scutellum with an obtuse tubercle. Length, 5.2—6 mm.

Chicago, Ill., May 23—June 13; taken at light (*Gerhard*). An introduced palæarctic species known in this country only from New York, Illinois and Minnesota. Occurs on *Carex vesicaria*.

IX. MIMOCEPS Uhler, 1890, 83.

Elongate, subcylindrical, shining species having the head subglobose, wider than front of pronotum, front subvertical; eyes large, hemispherical; antennæ slender, almost setaceous, as long as or longer than body, joint 1 strongly constricted near base, longer than head, 2 about three times as long as 1, 3 slightly shorter than 2, longer than 4; beak reaching almost to middle coxæ; pronotum as in key, subcampanulate, hind margin slightly sinuate; mesoscutum exposed; scutellum large, transversely impressed; elytra coriaceous, dimorphic, in macropterous form reaching or surpassing tip of abdomen, with cuneous not well defined but long, almost ligulate and cell of membrane long and large; legs slender, hind femora almost cylindrical. Two species are known, both occurring in our territory.

KEY TO SPECIES OF MIMOCEPS.

- a.* Pronotum wider behind than at middle and with a bilobate convexity on front half; posterior lobe of pronotum slightly convex. 657. *INSIGNIS*.
- aa.* Pronotum not wider behind than at middle, the convexity not bilobed; posterior lobe flat. 658. *GRACILIS*.

657 (916). *MIMOCEPS INSIGNIS* Uhler, 1890, 84.

Elongate, subcylindrical, widened and subdepressed behind the middle. Black, shining; elytra with a large triangular yellow spot at base, apical fourth of costal margin dull yellow; antennæ brownish-yellow, joint 1 fuscous at base; coxæ and trochanters bright yellow, femora and tibiæ brownish-yellow, tarsi and claws fuscous. Joint 1 of beak shorter than head, 3 much longer than any of the others. Elytra, macropterous form, much surpassing abdomen, the membrane distinct; brachypterous form, reaching apex of abdomen, their tips rounded. Front and middle legs widely separated, hind ones very long; basal joint of tarsi stoutest, as long as the others united. Length, 5—6 mm.

Described from Illinois and known only from that State and New York.

658 (917). *MIMOCEPS GRACILIS* Uhler, 1890, 85.

General color black, shining; elytra pale straw-yellow with a common broad postmedian blackish bar; legs and joints 1 and 2 of antennæ reddish-yellow, remainder of antennæ and tips of tarsi fuscous. Joint 1 of antennæ stout, feebly curved, slightly longer than head; 2—4 much more slender, 3 one-fourth shorter than 2, one-half longer than 4. Thorax subcylindrical, its subapical constriction deeper than the one at basal third, the space between them smooth, convex, the apical and basal areas finely rugose. Elytra, brachypterous form, reaching sixth dorsal, their tips broadly separately rounded. Length, 4—4.5 mm.

Argo, Ill., July 31—Aug. 7 (*Gerhard*). Ranges from Ontatio and northern New York west to Wisconsin and Utah. Occurs on sedges and grasses in low meadows and pastures.

X. *PITHANUS* Fieber, 1858, 303.

Elongate, opaque, glabrous species having the head triangular, almost vertical, rather wide, apex not compressed; eyes subspherical, rather prominent, contiguous to pronotum; antennæ finely pubescent, joint 1 short, stout, curved, not reaching tip of tylus; beak reaching hind coxae; pronotum feebly constricted near apex, its median area strongly swollen to form two prominent calli, the area behind these very short, finely transversely rugose, the hind margin subtruncate; scutellum convex, wholly visible, minutely strigose; elytra dimorphic, in macropterous forms surpassing abdomen, cuneus ill-defined, membrane with but one distinct cell; in brachypterous form strongly abbreviated, subequal in length to pro- and mesonota united; abdomen elongate or elongate-oval, base not constricted, margins strongly reflexed; first joint of hind tarsi twice the length of second. One species occurs in the eastern states.

659 (918). *PITHANUS MÆRKELII* (Herrich-Schaeffer), 1839, 78.

Brachypterous Female—Subcylindrical, rather robust. Black, subopaque, almost glabrous; first antennal, except base, two small transverse spots on vertex, entire corium, reflexed margin of dorsum, beak except tip and middle of ventrals 1—3, yellowish-white; legs reddish-yellow, a row of dots on under side of hind femora, tarsi in part and antennæ, except basal joint, fuscous. Joint 2 of antennæ about four times the length of 1, 3 and 4 filiform, united slightly longer than 2, 3 twice as long as 4. Elytra very short, barely covering first dorsal, their tips truncate. Clavus scarcely distinct from corium, finely transversely rugose. Male with tips of elytra rounded and inflexed connexivum fuscous. Length, 4.5—5 mm.

Honeoye Falls, N. Y., June 22 (*Davis*); swept from grasses growing along the edge of land set to nursery stock. An in-

roduced European species known in this country from Nova Scotia, Maine, New York and Victoria, B. C. The macrop-terous form is very rare, both here and in Europe.

Subfamily II. CAPSINÆ Reuter, 1883, 566.

Oval, rarely elongate species having, in addition to the characters given in the subfamily key, the head short, usually broader across the eyes than long, its front portion more or less declivent; cheeks not prominent, rarely elevated above the tylus; pronotum generally subtrapezoidal, rarely without a distinct collar, if so the abdomen constricted at base, disk with calli more or less distinct, the carinæ of sides, if present, very fine, not reaching apical angles; scutellum triangular, broadly exposed; elytra usually entire, cuneus triangular, its suture distinct; membrane with two cells; tibiæ generally finely spinose; first joint of tarsi as in key.

The subfamily is very large and is represented in our territory by 27 genera. These are distributed among three tribes which are separated as follows:

KEY TO TRIBES OF SUBFAMILY CAPSINÆ.

- a. Form not ant-like; abdomen not distinctly constricted; side margins of pronotum more or less distinct, frequently finely carinate; costal margins of elytra straight or slightly curved.
- b. Pronotal collar convex, about as wide as calli; tibiæ without spines but sometimes with stiff black hairs; body opaque, impunctate, usually in part red or yellow; front of head vertical, rarely declivent, the cheeks high; osteolar peritreme ill defined, its margins low; joint 1 of hind tarsi twice as long and thicker than joint 2. Tribe I. RESTHENINI, p. 681.
- bb. Pronotal collar, narrow, convex, never as wide as calli; tibiæ with rows of spines, sometimes rather fine; body usually more or less shining, often punctate; front of head usually declivent, the cheeks of medium height or low; osteolar peritreme well defined, its margins elevated; joint 1 of tarsi rarely longer than joint 2 or, if so, never thicker than 2. Tribe II. CAPSINI, p. 689.
- aa. Slender ant-like species; abdomen constricted at base; side margins of pronotum indistinct, more or less sinuate; elytra coarctate at middle. Tribe III. MYRMECORINI, p. 794.

Tribe I. RESTHENINI Reuter, 1905, 20, 28. (*Horistini* Van D.).

To this tribe, as characterized in the key, belong three genera of the subfamily Capsinæ, two of which are represented in the eastern states.

KEY TO EASTERN GENERA OF RESTHENINI.

- a.* Head short, vertical, when viewed from the side nearly square at apex; gula short, almost invisible; stricture of pronotal collar interrupted at side, not joining base of coxal cleft; second joint of hind tarsi not more than half the length of first.

I. PLATYTYLELLUS, p. 682.

- aa.* Head longer, declivent, when viewed from the side oblique, produced and narrowed to apex; gula rather long, oblique; stricture of pronotal collar joining base of coxal cleft; second joint of hind tarsi nearly or quite as long as first.

II. OPISTHEURIA, p. 689.

I. PLATYTYLELLUS Reuter, 1907, 71.

Elongate or oblong, opaque, impunctate species having the head short, broad, vertical, immersed in thorax to eyes, vertex without a median groove; eyes prominent, male, less so, female; beak reaching or surpassing middle coxæ; pronotum subcampanulate, apex one-half to two-thirds narrower than base, front lobe with collar wide, very prominent, sides obtuse, not margined, hind lobe convex, declivent, its basal margin broadly rounded, hind angles obtuse; scutellum smooth, convex, shorter than pronotum; elytra entire, longer than abdomen, their sides feebly, very broadly, curved, membrane with two cells, the larger one elongate.

Of the 14 species included by Van Duzee in his Catalogue, eight occur in the eastern states, while four species and a number of varieties have since been described by Knight. Several of the species are based on color characters alone and part of them will, in time, doubtless prove to be synonymous. They have in the past been mostly recorded under the generic name *Resthenia*.⁷⁸

KEY TO EASTERN SPECIES OF PLATYTYLELLUS.

- a.* Basal joint of antennæ not as long as width of vertex.
b. Larger, length to end of elytra 8 or more mm.; head wholly blackish or with a black spot. 660. CONFRATERNUS.
bb. Smaller, length less than 7.5 mm.; head red, its front rarely with a black spot.
c. Disk of pronotum with a median red stripe; length of joint 1 of antennæ not more than one and a half times the lateral width of an eye.

⁷⁸Walker (1873, 91) mentions a specimen of *Capsus divisa* H.S. from St. John's Bluff, Fla., as being in the British Museum. China writes that the species is not at present in the Museum. Van Duzee, in his Catalogue, presumably on the Walker record, gives "Fla." in the distribution notes. Barber (1906, 218) records *P. divisa* from Texas, and states that it has not been previously reported from the United States. It is therefore not considered in this work. The *Capsus incisus* Walker (1873, 92), listed by Van Duzee (1917, 312) as a *Platytyellus*, is said by China (Ms.) to be a *Paracalocoris*.

- d. Median stripe of pronotum extending back to join the red scutellum; basal half of hind femora orange-red. 661. RUBROVITTATUS.
- dd. Median stripe extending back only to middle of hind lobe; hind femora wholly black. 662. INTERCIDENTUS.
- cc. Disk of pronotum without a median red stripe; joint 1 of antennæ twice as long as lateral width of an eye. 663. NIGRICOLLIS.
- aa. Basal joint of antennæ equal to or greater than width of vertex.
- e. Pronotum wholly a uniform yellow or orange-red, elytra black.
- f. Scutellum orange-yellow; tibiæ clothed with short hairs, their length less than thickness of tibiæ; male genital without tubercles. 664. INSITIVUS.
- ff. Scutellum black; tibiæ clothed with longer hairs, their length greater than thickness of tibiæ; male genital with a tubercle each side. 665. NIGROSCUTELLATUS.
- ee. Pronotum in part black, rarely wholly bright red, but if so, the costal margins of elytra red or dull yellow.
- g. Larger, length, 9 or more mm.
- h. Joint 2 of antennæ three or more times the length of 1, distinctly longer than width of pronotum at base. 666. FRATERNUS.
- hh. Joint 2 of antennæ twice as long as joint 1, subequal in length to width of pronotum at base. 667. ROBUSTUS.
- gg. Smaller, length less than 8 mm.
- i. Lateral margins of elytra orange-red; pronotal disk in great part red with a black or fuscous stripe each side, or a fuscous blotch near base. 668. CIRCUMCINCTUS.
- ii. Elytra wholly black.
- j. Joint 1 of antennæ equal in length to width of vertex, plus one-third dorsal width of an eye; scutellum often with an orange or reddish median stripe; length, 7.5—7.7 mm. 669. RUBELLICOLLIS.
- jj. Joint 1 of antennæ but slightly longer than width of vertex; length, 7.7 mm. or less.
- k. Head red, the tylus and more or less of juga and lora blackish; pronotum red, the greater part of hind lobe usually black. 670. INSIGNIS.
- kk. Head and scutellum black, basal margin of vertex narrowly red; pronotal collar red, usually blackish above; surface finely granulate. 671. BOREALIS.

660 (902). PLATYTYLELLUS CONFRATERNUS (Uhler), 1872, 411.

Head crimson or blood-red, tylus and vertex wholly or in part black or fuscous-black; middle of collar and center of disk of pronotum, scutellum, elytra, legs and antennæ black; membrane dark brown, its veins blackish; basal halves of femora often with a reddish tinge; coxæ dull yellow; genital region fuscous. Joint 1 of antennæ slightly shorter than width of vertex, 2 as long as pronotum and scutellum united, 3 one-half the length of 2, one-third longer than 4. Beak reaching to or between hind coxæ. Length, 8 mm.

Ormond, Fla., April 4 (*W. S. B.*) ; holotype of var. *collaris* Knight Ms. Denver, Colo., July 15 (*Gerhard*). The recorded range extends from Massachusetts west to Michigan and Colorado and southwest to Florida and Texas. Although redescribed from Massachusetts by Uhler (1878, 399) and recorded by Parshley from both that State and Connecticut, Knight ignores it in his key (1923, 551). There is no previous definite station record from Florida. The black markings of head and pronotum vary much in size and the scutellum is said to be sometimes reddish at base. In the var. *collaris* Knight the upper surface of head, except jugæ, is wholly black and the pronotum red with a large black spot on middle of disk of hind lobe.

661 (910). *PLATYTYLELLUS RUBROVITTATUS* (Stal), 1862, 318.

Color above black; head except tylus and eyes, collar and median stripe of pronotum, scutellum except basal angles, basal joint of beak and under surface except a spot on mesosternum and another on sixth ventral, red or orange-red; legs black, the basal half of hind femora and coxæ in part orange-red. Joints 1 and 2 of antennæ of nearly equal thickness, 2 nearly four times as long as 1, male, three times as long, female, 3 two-thirds as long as 2, nearly twice the length of 4. Beak reaching hind coxæ. Upper surface finely granulate. Length, 5—5.3 mm.

Marshall Co., Ind., Aug. 8. Dunedin, R. P. Park and Moore Haven, Fla., Jan. 10—April 20. Frequent about Dunedin, hibernating beneath bunches of decaying weeds and other cover, and in spring swept from tall grass and herbage along the margins of ponds. Recorded by Barber from Sanford, Fla. Ranges from Nova Scotia and Massachusetts west to Northern Indiana and Colorado and southwest to Florida, Texas and Mexico.

662 (905). *PLATYTYLELLUS INTERCIDENDUS* (Distant), 1893, 426.

Basal lobe of pronotum, elytra, antennæ, tylus and legs black; head, collar, side margins and a short backward projecting spur on pronotum, scutellum except basal angles, and under surface, orange-red; spot on mesosternum and the genital region of abdomen fuscous. Beak reaching or slightly passing hind coxæ. Joint 2 of antennæ slightly more slender and nearly three times longer than 1, subequal in length to width of basal margin of pronotum, 4 two-fifths the length of 3. Elytra wider with sides behind middle more curved in female than in male. Length, 6.2—6.8 mm.

Dunedin and Ft. Myers, Fla., Nov. 26—April 26. Frequent about Dunedin in spring on low huckleberry plants in pine

woods and on herbage about the margins of ponds. Tarboro, N. Car., May 28 (*Brimley*). Described from Mexico. Recorded also from Biscayne Bay, Fla., and San Diego, Cal. The head of Distant's type was in part black, but Reuter (1913, 36) says that the color of head is variable, "etiam sanguineum, solum clypeo nigro," as in all the Florida specimens at hand. The basal half and more of pronotum is covered with a subcordate black spot, which reaches the hind angles.

663 (906). *PLATYTYLELLUS NIGRICOLLIS* (Reuter), 1876, 65.

Form and size of *intercidendus*. Color much the same, the pronotum with only the collar and side margins orange-red; all the coxæ and basal third of hind femora of the same hue. Joint 2 of antennæ nearly three times the length of 1, 3 one-fourth longer than 4. Length, 6—6.4 mm.

Lake County, Ind., June 29—July 14. Ranges from New England west to North Dakota and south to New Jersey.

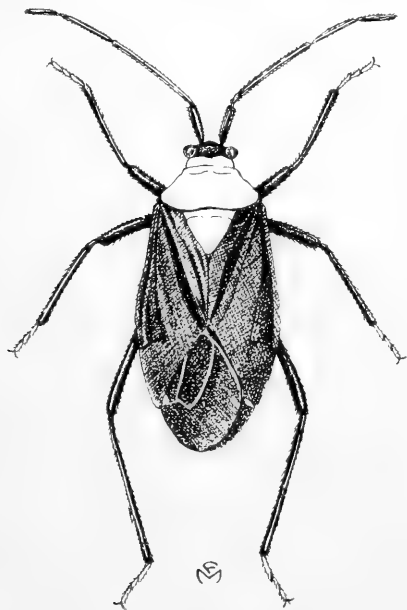


Fig. 165, X 4½. (Original).

664 (899). *PLATYTYLELLUS INSITIVUS* (Say), 1832, 21; I, 340.

Black, opaque, finely granulate; pronotum, scutellum, gula and prosternum wholly pale orange-yellow; beak fuscous, its basal joint tinged with yellow. Width of pronotal collar slightly greater than that of head. Joint 1 of antennæ one-fourth longer than width of vertex, 2 nearly three times longer than 1, 3 two-thirds the length of 2, twice as long as 4. Beak reaching or slightly passing hind coxæ. Length, 8.5—10 mm. (Fig. 165).

Marshall, Tippecanoe and Marion counties, Ind., June. Sanford, Istokpoga, Moore Haven, R. P. Park and Dunedin, Fla., March 3—April

13. Apparently scarce in Indiana but rather common in Florida, where it occurs in spring on foliage of shrubs and herbs along the borders of ponds and the paths and margins of moist dense hammocks. Recorded also from Crescent City, St. John's Bluff and Biscayne Bay. Described from Indiana and ranges

from Ontario and New England west to Colorado and south to Florida. Easily known by its large size and wholly pale pronotum and scutellum. Uhler (1884, 286) states that the head is sometimes yellow and that the "young occur upon wild blackberry and other bushes in the alleys of oak woods where the soil is damp and rich." Knight (1923, 556) has described from Maine a var. *angusticollis*, a small form (6.9—8 mm.) with width of pronotal collar less than width of head.

665 (—). *PLATYTYLELLUS NIGROSCUTELLATUS* Knight, 1923, 557.

Slightly larger than *insitivus*, color the same except that scutellum is black and sternum blackish with pleura orange-yellow. Genital of male with a prominent tubercle at base of left clasper and a smaller one at base of right clasper. Length, 9.2—9.7 mm.

Recorded only from New York and Pennsylvania.

666 (—). *PLATYTYLELLUS FRATERNUS* Knight, 1923, 557.

Head usually, except tylus, all or part of pronotum, and under surface crimson or orange-red; pronotum often with a large blackish blotch covering the median portion of hind lobe and sometimes with a small transverse median dark spot on collar; elytra either wholly sooty-black or with the margins paler; legs usually sooty-black, thickly clothed with long blackish-bristle-like hairs, coxæ paler. Antennæ sooty-black, joint 1, one-fifth longer than width of vertex, thickly clothed with inclined bristle-like hairs, 2 three times as long as 1, male, twice as long, female, clothed with short stiff dark hairs, 3 about one-third longer than 4. Beak reaching middle of hind coxæ. Length, 9—11 mm.

Ranges as a species from New England west to Minnesota and south and southwest to South Carolina and Florida. Knight (loc. cit) described three color varieties, separating them from the typical form as follows:

KEY TO COLOR VARIETIES OF *PLATYTYLELLUS FRATERNUS*.

- a.* Elytra uniformly black; pronotum red, median line of disk, including calli, black, thus leaving lateral margins of disk broadly red; head with front and vertex chiefly black. 666. *FRATERNUS*.
- aa.* Elytra with lateral margins pale or red.
 - (b.)* Pronotal disk with broad median ray extending from black scutellum to anterior margin black; calli and spot on dorsal surface of collar black. 666a. var. *RUBROMARGINATUS*.
 - (c.)* Pronotum and scutellum uniformly bright red, head, except tylus and the calli red. 666b. var. *REGALIS*.
 - (d.)* Head, except tylus, and the calli red; scutellum black; central area of pronotal disk black, in dark specimens spreading to involve all but lateral margins and the calli. 666c. var. *DISCIFER*.

Variety *rubromarginatus* is recorded from New Hampshire, New York, Pennsylvania and Michigan. The range of variety *regalis* is southern, extending from New Jersey southwest to Florida. In a specimen taken at Dunedin, Fla., April 19, the scutellum is dull red tinged with fuscous, showing that these color varieties merge into one another and are scarcely worthy their varietal names. A single specimen of var. *discifer* was swept April 10 from low huckleberry in pine woods near Dunedin. It is known only from Florida and Maryland.

667. (903). *PLATYTYLELLUS ROBUSTUS* Reuter, 1913, 32.

Elongate-oval. Dilute cinnabar red, opaque, pronotum thickly clothed with short pale hairs. Elytra with similar blackish ones; tylus, eyes, small median spot on apical margin of pronotum, scutellum except the basal angles, elytra and legs black; pronotum with calli and triangular spot on basal half fuscous tinged with reddish. Joints 1 and 2 of antennæ densely pilose, 1 about one-fifth shorter than width of head across eyes; 2 twice as long as 1, its length equal to width of pronotum at base; 3 more slender, three-fifths the length of 2. Beak slightly surpassing hind coxæ. Pronotum about one-fifth shorter than wide at base. Scutellum one-third shorter than pronotum. Tibiæ densely blackish pubescent, the longest hairs equal to thickness of tibia. Length, 10 mm.

Described from a single female taken in Georgia. Except in the longer second antennal, the description differs little from some of the color varieties of *fraternus* Knight.

668 (911). *PLATYTYLELLUS CIRCUMCINCTUS* (Say), 1832, 23; I, 343.

Color in great part orange-red; head with front and tylus fuscous-black; color of pronotum as in key; scutellum reddish, the basal angles black; elytra black with embolium and outer margin of corium and cuneus reddish; antennæ and legs black, the coxæ and basal fourth of femora red; genital segment and middle of last two ventrals fuscous. Joint 1 of antennæ one-eighth longer than width of vertex, 2 three times longer than 1, 3 two-thirds the length of 2, one-half longer than 4. Length, 7—7.5 mm.

McCuller's and Cary, N. Car., September 13—15 (*Brimley*). Described from Indiana. Ranges from New England west to North Dakota and Utah. In one of the North Carolina specimens the pronotum is wholly red, in the other only tinged with fuscous near the base.

669 (—). *PLATYTYLELLUS RUBELLICOLLIS* Knight, 1923, 555.

Black; collar, front margin of disk of pronotum and lower half of propleura orange-red to pink; scutellum sometimes (var. *vittiscutis* Knight) with an orange-red stripe; this rarely (var. *confluens* Knight) reaching forward to collar of pronotum. Joints 1 and 2 of antennæ black,

1 one-fifth longer than width of vertex; 2 slightly tapering from base to apex, thickly clothed with short black hairs, three times as long as 1; 3 and 4 fuscous, 3 three-fifths the length of 2, nearly twice as long as 4. Pronotum with basal margins of calli impressed, disk strongly convex, both it and elytra finely granulate, finely and densely pubescent. Length, 7.5—7.7 mm.

St. Anthony Park, Minn., June 2 (*Minn. Univ. Coll.*). Described from Minnesota, the two color varieties also from there and from Maine. Adults and nymphs of the typical form were taken on the figwort, *Schrophularia leporella* Bicknell.

670 (909). *PLATYTYLELLUS INSIGNIS* (Say), 1832, 22; I, 342.

Velvety-black, opaque, finely granulate; head except tylus, pronotum except part of the hind lobe and scutellum except the side margins or basal angles, red; ventrals black, the basal ones tinged with red. Joint 1 of antennæ but one-tenth longer than width of vertex, 2 nearly three times the length of 1, 3 about two-thirds the length of 2, one-half longer than 4. Beak reaching hind coxæ. Length, 6.7—7.5 mm.

Dunedin, Fla., April 10 (*W. S. B.*). Fairfax Co., Va., and Beltsville, Md., June 22—July 1 (*Davis*). Ranges from Ontario and New England west to Iowa and North Dakota and southwest to Florida and Texas. Recorded from many stations but part of the records doubtless should be referred to *rubrovittatus* and *intercidendus*, which it closely resembles in size and color. In Florida it is much less common than *rubrovittatus*.

670a (—). *PLATYTYLELLUS INSIGNIS FRATERCULUS* Knight, 1923, 554.

Differs from the typical form in having the scutellum black and ventral surface usually wholly red; hind lobe of pronotum black with its side margins narrowly pale, as is also often the case in typical *insignis*. Length, 5.1—6.6 mm.

Crawford and Posey counties, Ind., June 26—July 7. Laurel Hill, N. Car., June 22 (*Brimley*). Ranges from southern Indiana north to Minnesota. The North Carolina specimens have the ventrals wholly black, thus forming a connecting link between the typical form and Knight's variety.

671 (—). *PLATYTYLELLUS BOREALIS* Knight, 1923, 553.

Dull black; base of vertex, collar and a lateral stripe on flanks of pronotum, red; ventrals 1—4 orange-red. Joint 1 of antennæ as long as width of vertex, male, slightly longer, female; 2 two and three-fourths times the length of 1, 3 two-thirds as long as 2, 4 three-fourths the length of 3. Beak reaching between hind coxæ. Length, 6.3 mm.

Morrison Co., Minn., July 10 (*Minn. Univ. Coll.*). A species of northern distribution ranging from Ontario and New Eng-

land west to Alberta and North Dakota. Very close to *nigricollis* and may prove to be only a color variety of that species.

II. OPISTHEURIA Reuter, 1907a, 170.

Elongate or subobovate, opaque impunctate species having the head declivent, distinctly wider than collar of pronotum, about as long as width across eyes, male, somewhat longer, female; beak reaching middle coxæ; antennæ slender, as long as body; pronotum slightly wider at base than long, apex about one-half narrower than base, basal lobe feebly convex, declivent towards apex, its hind margin with sides rounded and middle subtruncate; elytra entire, surpassing abdomen, sides parallel, distinctly dilated behind the middle, claval commissure slightly longer than scutellum, cuneus longer than its base, membrane with two cells; legs pilose. Three species are known, one from our territory.

672 (913). OPISTHEURIA CLANDESTINA Van Duzee, 1915, 110.

Elongate, subparallel, male, obovate, female. Pronotum and ventral surface, except genital segments, orange-red; head red with front and tylus fuscous-black; scutellum and elytra fuscous-brown to black, the side margins of the latter broadly pale; antennæ and legs brownish-black, coxæ reddish, basal halves of femora often in part dull yellow. Joint 1 of antennæ slightly longer than head, 2 one-half longer than 1, 3 two-thirds the length of 2, one-third longer than 4. Loræ separated from the cheeks by a distinct suture. Collar prominent, longer than the calli. Length, 7—7.5 mm.

Harrison Co., Ind., Aug. 20. Sanford and Dunedin, Fla., Dec. 25—April 10. At Dunedin both nymphs and adults were taken in April by beating along the margins of wet hammocks. The Indiana specimen has the base of pronotum clouded with black. Described from Crescent City, Sanford and Ft. Myers, Fla. Knight (1918b, 115; 1923, 550) has recorded the typical form from New York and has named two color varieties, *dorsalis* having the pronotal disk largely black and ventrals orange-red, from New York and Ohio; and *ventralis* with pronotum and ventral surface chiefly black from New York and Wisconsin. As the color, like that of a horse, varies greatly, these names are superfluous.

Tribe II. CAPSINI Reuter, 1883, 566.

To this tribe, as characterized in the key, p. 681, belong the great majority of North American Miridæ of the subfamily

Capsinæ. They were separated by Reuter (1909, 9) into 25 genera. Van Duzee in his Catalogue recognized 31 genera from America north of Mexico. Representatives of 23 are known from the eastern states. For convenience in classification these are divided into two Divisions, separated as follows:

KEY TO DIVISIONS OF THE TRIBE CAPSINI.

- a. Body above impunctate, or with fine aciculate punctures only.

Division I. PHYTCORARIA, p. 690.

- aa. Body above, or at least the pronotum, punctate, sometimes very finely, but usually distinctly so; calli usually prominent.

Division II. CAPSARIA, p. 751.

Division I.—PHYTCORARIA Douglas & Scott, 1865, 29, 299.

To this division belong 13 of the 23 eastern genera of the tribe Capsini. They differ much in form and general appearance, but all are devoid of distinct punctures on the pronotum. As here treated the Division includes also the *Dichrooscytaria*, the characters given in their separation by both Douglas and Scott and Van Duzee (1916a, 206) being variable and comparative only, not fixed.

KEY TO EASTERN GENERA OF PHYTCORARIA.

- a. Basal joint of antennæ very stout, thickly clothed with flattened hairs; apical half of second joint distinctly thickened.

I. NEUROCOLPUS, p. 691.

- aa. Basal joint of antennæ without flattened hairs.

- b. Pronotum with two opaque, usually rounded black spots placed in small concavities behind the calli, these rarely wanting, sometimes merged with larger spots on basal half of disk; basal joint of antennæ clothed with long black hairs and setæ.

II. PARACALOCORIS, p. 692.

- bb. Pronotum without black spots, or if present the spots ill defined, not in concavities, and basal joint of antennæ without long black hairs or setæ.

- c. Second joint of antennæ strongly swollen, clavate or fusiform, tapering toward the base.

III. GARGANUS, p. 698.

- cc. Second joint of antennæ linear or only slightly thickened toward apex.

- d. Hind femora distinctly surpassing tip of abdomen, flattened and broader on basal halves, tapering and slender toward apex; body above opaque and impunctate.

IV. PHYTCORIS, p. 699.

- dd. Hind femora shorter, not or scarcely extending beyond tip of abdomen.

- e. Joint 1 of hind tarsi much longer than joint 3; color greenish yellow with two ill defined stripes or spots on pronotum and a stripe on each elytron fuscous.

V. STENOTUS, p. 730.

- ee. Joint 1 of hind tarsi shorter than joint 3; color not as above.
- f. Calli of pronotum vague or wanting; vertex with an impressed median line, both it and upper part of face opaque, distinctly obliquely striate. VI. CREONTIADÆ, p. 731.
- ff. Calli usually conspicuous; vertex shining, rarely (*Adelphocoris*) with distinct sulcus or striæ.
- g. Dorsal surface distinctly pubescent, opaque or nearly so.
- h. Body above and below clothed with sericeous or tomentose pubescence; head slightly exserted, the eyes not in contact with pronotal angles; vertex with two small pale spots adjoining the inner border of eyes. VII. POLYMERUS, p. 733.
- hh. Body clothed only with simple pubescence, not tomentose; vertex without pale spots near eyes.
- i. Head broad, not exserted, the large eyes in contact with and overlapping the front angles of pronotum; hind margin of eyes sulcate and forming a curved line with base of vertex; pronotum without black spots.
- j. Head declivent; vertex convex; width of head across eyes distinctly less than width of pronotum at base. VIII. DICHROOSCYTUS, p. 741.
- jj. Head subvertical; vertex flat; width of head across eyes almost as great as width of pronotum at base. IX. BOLTERIA, p. 743.
- ii. Head narrower, more or less exserted, eyes convex behind and well removed from pronotal angles; pronotum usually with a vague black spot behind each callus.
- k. Joint 4 of antennæ equal in thickness to joint 2 at base; sides of pronotum without carinæ; collar of pronotum very narrow, its width not greater than thickness of antennal joint 4; color usually brown or fuscous, the margins of elytra paler. X. ADELPHOCORIS, p. 744.
- kk. Joint 4 of antennæ distinctly thinner than joint 2 at base; collar distinctly wider than thickness of joint 4; color a nearly uniform pale greenish-yellow. XI. CALOCORIS, p. 746.
- gg. Dorsal surface glabrous, highly polished.
- l. Beak reaching to or beyond hind margin of middle coxæ; second joint of antennæ almost glabrous; elytra not vitate. XII. HORCIAS, p. 747.
- ll. Beak shorter, but slightly surpassing front coxæ; second joint of antennæ thickly clothed with black, bristle-like hairs; elytra with black and yellow stripes. XIII. PÆCILOCAPSUS, p. 750.

I. NEUROCOLPUS Reuter, 1876, 69.

Rather robust species of medium size having the head porrect, slightly exserted, as broad across eyes as long, its front subvertical; eyes large, prominent; beak reaching hind coxæ, its basal joint reaching front ones; pronotum subcampanulate,

about as wide at base as long, strongly narrowed toward apex, its front portion with collar very distinct, side margins sinuate at middle, without lateral carinæ, hind lobe strongly convex, its hind margin broadly rounded; femora with apical halves thickly pilose; hind tarsi with joints 1 and 2 subequal, 3 slightly longer. One of the two known species occurs in our territory.

673 (920). *NEUROCOLPUS NUBILUS* (Say), 1832, 22; I, 341.

Elongate-oval, thinly pubescent with short inclined yellow hairs. Color exceedingly variable, usually some shade of brown, more or less tinged with greenish-gray and clothed with fuscous, often with numerous yellow dots or blotches; head, pronotum, scutellum, clavus, femora and under surface usually in great part clouded with fuscous; tibiæ yellow, all with three brown or fuscous rings; base of cuneus often tinged with reddish, its apex and the membrane usually tinged with fuscous. Antennæ with joint 1 and basal half of 2 reddish-brown, remainder fuscous; 1 stout, subclavate, slightly shorter than pronotum, thickly setose; 2 about twice as long as 1, much more slender at base, its apical half distinctly thickened; 3 and 4 very slender, subequal in length, united about one-third shorter than 2. Length, 6—8 mm. (Fig. 166).

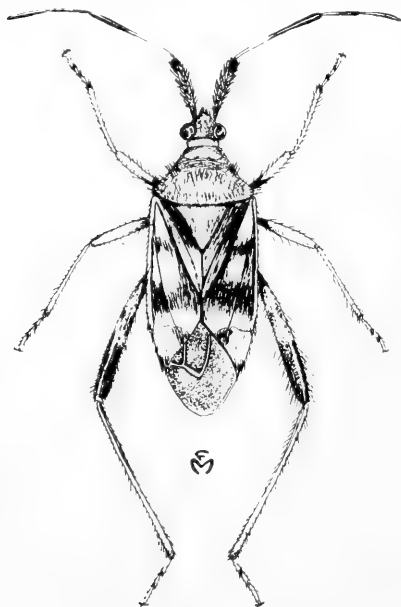


Fig. 166, X 7. (Original).

Common throughout Indiana, June 3—Oct. 13. Occurs on foliage and flowers of shrubs and herbs, especially in

and along the margins of dense moist woodlands. Taken in numbers in June from the flowers of false indigo, *Amorpha fruticosa* L.; staghorn sumac, *Rhus hirta* L.; alternate-leaved dogwood, *Cornus alternifolia* L.; and button-bush, *Cephalanthus occidentalis* L. Ranges from Quebec and New England west to South Dakota and Colorado and south to Florida and New Mexico. Not taken by me in Florida, but recorded by Van Duzee from Sevenoaks, near Clearwater.

II. *PARACALOCORIS* Distant, 1883, 263.

Elongate- or oblong-oval, opaque, impunctate, pubescent

species having the head porrect, inserted in thorax to eyes, its front declivent; eyes large, prominent, projecting outward beyond front angles of pronotum; beak reaching middle coxæ; antennæ with joint 1 swollen, terete, thickly clothed with stiff black inclined hairs, 2 gradually slightly thickened from the base, 3 and 4 much more slender than 2; pronotum subtrapezoidal, its width at base about three times that of apex, apical constriction distinct, side margins straight, not carinate, disk usually with black spots as in key, its basal half convex, strongly declivent toward apex with hind margin broadly rounded; elytra slightly surpassing tip of abdomen; legs moderately long, hind femora usually swollen, more or less curved; left clasper of male with a large rounded or pointed lobe on upper side at base. About a dozen species are known from North America, eight of which occur in the eastern states.

KEY TO EASTERN SPECIES OF PARACALOCORIS.

- a.* Hind tibiæ thickly clothed with long erect hairs which obscure or become confused with the tibial spines; joint 1 of antennæ slightly longer than pronotum; scutellum usually bright yellow or orange-red. 674. *SCRUPEUS*.
- aa.* Hind tibiæ with hairs shorter and more appressed, especially on inner side, the hairs not easily confused with the true spines.
 - b.* Pronotum black with a median orange-red cross-bar, the latter with a backward projecting spur; concavities behind ocelli present, but without black spots; apical joint of antennæ dull white. 675. *INCISUS*.
 - bb.* Pronotum without median pale cross-bar as above; black spots behind calli present; apical joint of antennæ not whitish.
 - c.* Joint 1 of antennæ distinctly longer than pronotum.
 - d.* Basal width of pronotum more than 2 mm.; color everywhere except discal spots of pronotum and membrane, pale or dark reddish-brown. 676. *ADUSTUS*.
 - dd.* Basal width of pronotum less than 2 mm.; color chiefly fuscopiceous, the costal margin frequently pale. 677. *HAWLEYI*.
 - cc.* Joint 1 of antennæ subequal to or shorter than length of pronotum.
 - e.* Color dull yellow or reddish, usually more or less mottled with fuscous; second antennal not exceeding 2.2 mm. in length.
 - f.* Color above pale greenish-yellow mottled with numerous fuscous spots or blotches, these enclosing minute yellow dots; apical third of scutellum a uniform yellow; legs and first antennal variegated with brown and yellow; second antennal with apical third black. 678. *MULTISIGNATUS*.
 - ff.* Color not as above; apical third of scutellum not wholly yellow.
 - g.* Color straw-yellow to dark brownish-gray or dark brown variegated with paler spots; second antennal with the ex-

- treme base and apical third blackish, the remainder brownish-yellow, but usually paler at each end next to black color; apex of corium with a fuscous or piceous mark. 679. COLON.
- gg. Color dull tawney-red, often variegated with yellow; pronotum, scutellum and elytra indistinctly striped with yellow; apex of corium without a dark spot. 680. HEIDEMANNI.
- ee. Color fuscous-black, not mottled; costal margin or more of corium usually pale; second antennal at least 2.4 mm. in length, usually longer; first antennal nearly equalling length of pronotum. 681. LIMBUS.

674 (979). *PARACALOCORIS SCRUEUS* (Say), 1832, 23; I, 342.

Color exceedingly variable, in the typical form black with pronotum behind the calli and scutellum bright orange-yellow, the former with collar, calli, and usually a small vague spot near each basal angle fuscous or black; the round impressed spot behind each callus velvety-black; tarsi and joints 3 and 4 of antennæ fuscous-brown, thickly and finely pubescent with yellowish hairs. Joint 2 of antennæ two-thirds longer than 1, 3 subequal in length to 4. Elytra sparsely clothed with short yellow inclined hairs. Length, 6.3—6.8 mm.

Frequent throughout Indiana, May 20—Aug. 1. Occurs especially on wild grape in and along the borders of thickets and woodlands. Henderson, Ky., June 3 (*Marshall*). Ranges from Quebec and New England west to Colorado and south to Georgia. McAtee (1916, 369) and Knight (1923, 611) have described and given keys to 18 color varieties. Of these the two most widely distributed are:

674a (—). *PARACALOCORIS SCRUEUS* PAR McAtee, 1916, 373.

Fuscous-black; pronotum with median spot and a narrow stripe just outside each discal black spot prolonged backward, dull yellow; costal margin of elytra and median stripe on scutellum also dull yellow.

Starke and Posey counties, Ind., June 3—July 1. Ranges from New York west to Nebraska.

674b (—). *PARACALOCORIS SCRUEUS* BIDENS McAtee, 1916, 374.

Fuscous-black; pronotum (except calli, collar and velvety spots behind calli), scutellum, embolium and outer half of corium, orange-red or reddish-yellow; cuneus scarlet-red, its tip blackish; clavus and inner half of corium fuscous-black. Length, 6—6.5 mm.

Marion Co., Ind., May 6—Aug. 14; frequent on foliage of herbs and shrubs in dense woodland (*H. S. B.*). Pine Island, N. Y., and Ramsey, N. J., June (*Davis*). Ranges from New England west to Illinois. All variations between this and typical *scrueus* occur and the student wishing to name color

forms is referred to the papers of McAtee and Knight above cited.

675 (912). *PARACALOCORIS INCISUS* (Walker), 1873, 92.

Elongate-oval. Dark fuscous-brown to black; head with a vague pale spot each side of base of vertex; eyes brown with a pale curved line behind and beneath; pronotum fuscous or blackish with a wide median orange-red cross-bar, this usually widened on sides to cover side margins behind the collar and with median spur projected backward, this sometimes extending onto scutellum and dividing the black of basal half of pronotum into two large spots (*P. externus scissus* Knight); scutellum either wholly black (*P. externus totus* Knight) or orange-red with dark side margins (*P. verus* Knight); elytra wholly black, the membrane fuscous; legs black or fuscous, the basal halves of femora sometimes orange-red; tarsi fuscous-brown or paler; antennæ black with white apical segment, the basal joint sometimes with an orange base. Joint 1 of antennæ longer than pronotum, 2 twice as long as 1, 3 slightly longer and distinctly stouter than 4. Pronotum and elytra thinly clothed with very fine grayish appressed hairs. Length to tip of membrane, 7.5—8 mm.

Ormond, Dunedin, Bassenger and Lake Wales, Fla., Dec. 19—April 19. Numerous examples were taken from foliage of oak and bay along the margins and paths of dense moist hammocks. Easily known from our other species by the pale fourth antennal, lack of discal black spots and peculiar markings of pronotum and scutellum. The *P. verus* Knight Ms. and the variety *P. externus totus* Knight Ms. I swept on Dec. 19 from a branch of the same oak and they are mere color forms of the same species. The var. *scissus* Knight Ms., taken at Ormond April 15, differs only in having the median pale ray of pronotum prolonged backward to apex of scutellum, thus dividing the black area of both the basal half of pronotum and scutellum into two parts. According to China, who compared two of my specimens with Walker's type from St. John's Bluff, Fla., the typical *incisus* is the form with median pale ray of pronotum extending almost to base, and scutellum orange-red with black side margins, or the *P. verus* Knight Ms. China states that the *C. externus* H.-S. of Walker (1873, 91), also from St. John's Bluff, "is possibly another variety of *incisus*. It agrees very well with the colored figure of H. Schaeffer's *externus*." The *P. novellus* Blatch. (1926, 163) is a synonym of *incisus*. Whether *incisus* in turn is the same as *externus* cannot be judged from colored figures alone, but only by a comparison of the types. The latter species is placed by Van Duzee as a variety of *P. scrupus* (Say). McAtee (1916, 366) states that in his opinion it is not

a *Paracalocoris*, as no member of that genus has the "first antennal joint as long as head and thorax together," as described and figured by H.-Schaeffer.

676 (984 $\frac{1}{8}$). *PARACALOCORIS ADUSTUS* McAtee, 1916, 377.

Color a nearly uniform reddish-brown, rather thickly clothed above with short appressed yellow hairs; inner margin and apical third of clavus, second antennal, tibiæ and tips of tarsi more or less fuscous-brown; membrane dusky, its veins paler. Joint 1 of antennæ one-tenth longer than pronotum, 2 three-fifths longer than 1, 3 slightly longer than 4, the two united a little shorter than 2. Length, 8 mm.

Lakehurst, N. J., June 13, type (*Davis*). Recorded elsewhere only from Berrien Co., Mich., where Hussey took a few examples from willow in July.

677 (984 $\frac{1}{4}$). *PARACALOCORIS HAWLEYI* Knight, 1916b, 377.

Elongate, subparallel, rather robust. Color variable; head, apical third of pronotum and costal margins of elytra usually orange-red or dull yellow, cuneus reddish, remainder of upper surface fuscous-black; under surface except the region of genital plates, orange-red; legs and antennæ black, coxæ paler. Joint 1 of antennæ one-eighth longer than pronotum, 2 two-thirds longer than 1, 3 less than one-half the length of 2, 4 three-fifths the length of 3. Discal spots of pronotum usually merged with the dark color of basal portion. Length, 6.3—7.5 mm.

Marion and Martin counties, Ind., June 19—July 13. The known range extends from Massachusetts west to Indiana and south to Maryland. Breeds on cultivated hop and apple in New York. McAtee and Knight (loc. cit.) have described three color varieties. The Indiana specimens at hand belong to Knight's var. *ancora* in which the elytra are almost wholly fusco-piceous, without a pale stripe along the corium.

678 (983). *PARACALOCORIS MULTISIGNATUS* Reuter, 1909, 40.

Oblong-oval. Pale greenish-yellow, more or less blotched with fuscous; pronotum with front and hind margins and a stripe back of each discal spot fuscous, flecked with small yellow dots, the space between the dark stripes and also the sides of disk lemon-yellow; apical third of scutellum, apex of clavus and middle of cuneus lemon-yellow; corium with a large irregular spot near middle, a smaller one near apex and numerous scattered dots of the same hue; membrane dusky, marbled with paler; under surface and legs pale yellow, the apical third of femora, two rings on tibiæ, tips of tarsi and usually some vague markings on sides of ventrals fuscous. Joint 1 of antennæ fuscous mottled with yellow, subequal in length to pronotum, 2 twice as long as 1, its apical third black, remainder reddish-brown, with yellow ring at base and another in front of middle; 3 and 4 subequal, each about half the length of 2. Length, 6—7 mm.

Swannanoa, N. Car., July (*Brimley*). Ranges from Maryland southwest to Texas. Variable to some extent in color.

679 (1980). *PARACALOCORIS COLON* (Say), 1832, 25; I, 346.

Grayish-brown or brownish-yellow, rather thickly clothed with fine silky yellow hairs and usually more or less variegated with pale fuscous and small yellow spots, the fuscous often forming large blotches on basal half of pronotum, scutellum and clavus and along the inner margin of corium; membrane fuscous, paler at middle, its veins yellow; legs dull yellow, the apical third or more of femora and two rings on tibiæ brownish or blackish; under surface brownish with paler linear markings each side. Joint 1 of antennæ brownish, spotted with yellow, one-fifth shorter than pronotum, 2 twice the length of 1, colored as in key; 3 and 4 fuscous, very slender, 3 two-fifths the length of 2, one-fourth longer than 4. Length, 5.8—6.5 mm.

Described from and found throughout Indiana, but scarce, June 3—Aug. 30. Staten Island, N. Y. (*Davis*). Henderson, Ky., May 25 (*Marshall*). Occurs on the foliage of Virginia creeper, poison ivy and other shrubs in moist woodland. Ranges from Ontario and New England west to Kansas and Colorado. McAtee has described three color varieties, two of which are fairly constant in hue.

679a (—). *PARACALOCORIS COLON CASTUS* McAtee, 1916, 382.

Color a nearly uniform dull straw-yellow to pale reddish-brown without paler spots; middle of scutellum and base of third antennal paler; cuneus tinged with reddish. Length, 5.5—7 mm.

Marion Co., Ind., June 19—30 (*W. S. B.*). Staten Island, N. Y., Aug. 17 (*Davis*). Ranges from New York to Maryland. Occurs on willow.

679b (—). *PARACALOCORIS COLON COLONUS* McAtee, 1916, 383.

Differs from typical *colon* in having joint 2 of antennæ pale or brownish on basal half, but without a distinctly paler ring next to the blackish base; pronotum orange-red to fuscous, frequently vittate with pale yellow; elytra dark reddish-brown to fusco-piceous, both they and pronotum more or less spotted with yellow. Length, 5.5—6.5 mm.

Marion, Knox and Floyd counties, Ind., June 8—July 16. Ranges from New England west to Minnesota and south to New Jersey. A form of this in which the elytra are devoid of yellow spots is var. *amiculus* McAtee.

680 (1982). *PARACALOCORIS HEIDEMANNI* Reuter, 1909, 40.

General color pale orange-yellow to dark reddish-brown or mahogany-red, thickly clothed with prostrate golden yellow hairs; head reddish-yellow with diagonal lines each side, these usually darker; front margin

of pronotum and median and two vague lateral stripes on both pronotum and scutellum, outer margin of apical half of clavus, commissure, costal margin and diagonal stripe on apical half of corium, usually yellowish or tinged with yellow; membrane dusky with paler markings, veins yellowish; legs reddish-brown, femora dotted with yellow; under surface with alternate yellow and darker stripes. Joint 1 of antennæ as long as pronotum, pale reddish-brown flecked with yellow, its tip blackish; 2 as long as width of hind margin of pronotum, or about three-fourths longer than 1, its apical half piceous; 3 and 4 united subequal in length to 2, their apical two-thirds or more blackish. Beak reaching tips of hind coxæ, its apex black. Length, 6—7 mm.

LeRoy, Ala., June 12 (*Minn. Univ. Coll.*). Recorded elsewhere only from Maryland and the two Virginias, where it is said to breed on the shrubby St. Johnswort, *Hypericum prolificum* L. McAtee (1916, 386) has named the pale form var. *ablutus*, though Reuter expressly states that the general color of the typical form is "pallide flavo-testaceus, leviter nitidulus."

681 (984½). PARACALOCORIS LIMBUS McAtee, 1916, 380.

Fuscous-black, rather thickly clothed with prostrate black hairs; head, except a median spot on vertex, collar and median area around discal spots of pronotum and marginal stripe of elytra widened behind and extending back to tip of cuneus, orange-red; membrane brownish-fuscous; legs fuscous, some vague spots on femora and tarsi pale; under surface reddish-yellow, the ventrals more or less fuscous. Joint 1 of antennæ blackish, thickly clothed with inclined bristly hairs; 2 and 3 fuscous-brown with shorter hairs, the former about two-thirds longer than 1; 4 paler, slightly longer and more slender than 3. Length, 7.5—8 mm.

Spring Hill, Ala., April 27 (*Gerhard*). Described from Clayton, Ga., and recorded elsewhere only from Massachusetts.

III. GARGANUS Stal, 1862, 321.

Small, elongate, subparallel species having the head porrect, wider across the eyes than long, its front subvertical; eyes prominent, distinctly projecting outward beyond apical angles of pronotum; beak passing hind coxæ, its basal joint longer than head; joint 1 of antennæ filiform, longer than pronotum, 2 much more robust, fusiform, densely clothed with stiff inclined black hairs, 3 very slender, one-half the length of 2, one-third longer than 4; pronotum subtrapezoidal, one-half wider at base than long, disk declivent with sides straight, strongly converging from base to apex, collar very narrow, calli obsolete; elytra with side margins parallel. Four species are known, one from our territory.

682 (971). GARGANUS FUSIFORMIS (Say), 1832, 24; I, 344.

Color above black or fuscous-black; base of third antennal, collar of pronotum, a wide median stripe on scutellum, a narrower one along commissure and each costal margin, ivory-white; legs, basal joint of antennæ and base of abdomen reddish-yellow; membrane, tarsi and third and fourth antennals in great part fuscous. Length, 4—5 mm.

Marion, Putnam, Knox and Orange counties, Ind., scarce, May 30—Oct. 10; not taken but doubtless occurs in the northern counties (*W. S. B.*). Raleigh, N. Car., July 23 (*Brimley*). Agricultural College, Miss. (*Weed*). Occurs on low herbage in moist places. Ranges from Ontario and New England west to Michigan and Kansas and south to Florida, where it has been recorded only from Jacksonville and Crescent City. Of its occurrence in southern Michigan Hussey says: "This agile Mirid was common in the grass in damp localities from June 20 to Sept. 1."

IV. PHYTOCORIS Fallen, 1814, 10.

Elongate-oval or subparallel Mirids of medium size having the head short, porrect, as broad as or broader across the eyes than long, its front declivent; eyes prominent, longer than wide; vertex usually without a median groove, not carinate at base; beak reaching beyond middle coxæ, joints 1 and 2 of equal length, 3 longer than 4, which is about one-half as long as 2; antennæ slender, almost filiform, as long as or longer than body, its joints variable in length and thickness according to species, the first sparsely clothed with stiff hairs; pronotum short, subtrapezoidal, its subapical constriction distinct, collar very short, calli more or less distinct, disk moderately declivent from the base forward, its hind portion convex and hind margin subtruncate or broadly rounded, slightly emarginate at middle; mesoscutum narrowly exposed; elytra surpassing abdomen, cuneus long, triangular, both it and membrane usually deflexed; hind tarsi with joints 2 and 3 subequal, 1 shorter.

The genus is a very large one, 37 North American species having been recognized by Van Duzee in his Catalogue and 30 or more having since been described by Knight. Of these 57 occur in our territory.⁷⁹ For convenience of study they are,

⁷⁹The *P. inops* Uhler (1877, 413), recorded by Van Duzee from several eastern states, was described from Colorado and, according to Knight (Ms.), the eastern records are erroneous. Uhler later (1878, 402) redescribed it from Massachusetts and New Hampshire, but his second description varies widely from the first, and Knight states was based upon a specimen of *Neurocolpus*.

following Knight (1923, 615), separated into four groups, as follows:

KEY TO GROUPS OF EASTERN SPECIES OF PHYTOCORIS.

- a.* Membrane of elytra speckled or irrorate with small fuscous and pale spots; median lobe of male genital structure provided with a flagellum (fig. 16)⁸⁰ without or rarely (*junceus*) bearing distinct teeth.
GROUP I, p. 700.
- aa.* Membrane either uniformly fuscous, nearly pale, or marbled with pale, never distinctly speckled, but the margins of fuscous areas sometimes with small pale dots; median lobe of male genital structure with a flagellum bearing distinct teeth (fig. 1).
- b.* Basal joint of antennæ shorter than width of head.
GROUP II, p. 711.
- bb.* Basal joint of antennæ distinctly longer than width of head.
- c.* General color fuscous or blackish on a paler background; antennæ more blackish or fuscous than pale, if joint 2 broadly pale at middle then the dorsum chiefly fuscous to blackish.
GROUP III, p. 714.
- cc.* General color usually yellowish to reddish over a paler background; antennæ more nearly pale-yellowish or reddish, than blackish, joint 2 sometimes fuscous at apex and near base, but more pale than fuscous.
GROUP IV, p. 724.

GROUP I.—PHYTOCORIS.

In this group the membrane of elytra is irrorate or flecked with small fuscous pale dots; the basal joint of antennæ is variable in length, but always longer than the width of head across the eyes. It corresponds to Group I of Knight in the "Hemiptera of Connecticut," and comprises 17 of our eastern species. They occur mainly in crevices in the bark of the trunks of trees and are probably largely predaceous in habit.

KEY TO EASTERN SPECIES OF GROUP I, PHYTOCORIS.

- a.* Basal joint of antennæ greatly thickened, cylindrical, its thickness nearly equal to dorsal width of an eye.
- b.* Joint 2 of antennæ yellowish, its apical fourth blackish; joint 1 slightly longer than head and pronotum united, thickly clothed with long inclined black hairs; form elongate, subparallel; length 7.5—8.5 mm.
683. LASIOMERUS.
- bb.* Joint 2 of antennæ uniformly yellowish, scarcely dusky at apex.
- c.* Basal joint of antennæ with two distinct types of hairs, erect black bristle-like ones with shorter more recumbent sparsely set black ones between them; scutellum reddish each side of median line, clothed with silky white pubescence.
684. PALLIDICORNIS.

⁸⁰The figures of male genitalia cited under certain species of *Phytocoris* refer to those on Plate XI, p. 712.

- cc.* Basal joint of antennæ with the shortest hairs almost as long as the erect bristle-like ones; scutellum uniform yellowish sparsely clothed with simple erect pubescent hairs. 685. RUBROPICTUS.
- aa.* Basal joint of antennæ more slender, its thickness distinctly less than dorsal width of eye.
- d.* Joint 2 of antennæ uniformly yellowish, sometimes somewhat dusky at apex and near base; upper surface chiefly reddish or fuscous on a pale yellowish background. 686. ULMI.
- dd.* Joint 2 of antennæ chiefly blackish or fuscous-brown, usually annulated with pale.
- e.* Joint 2 of antennæ black at base with a pale ring somewhat removed from base.
- f.* Length of first antennal equal to that of head and pronotum united, also equal to width of pronotum at base; basal submargin of disk of pronotum with two black calloused densely pilose spots each side of middle; length, 5—6 mm. 687. ANTENNALIS.
- ff.* Length of first antennal only equal to length of pronotum plus one-third that of head, also shorter than width of pronotum at base; length, 7 mm. 688. PALMERI.
- ee.* Joint 2 of antennæ with a pale ring at base, blackish beyond.
- g.* Third antennal with a pale ring at base and another at middle.
- h.* Upper surface with both black and yellowish scale-like hairs turned on edge; lower half of face more or less fuscous; propleura pale on lower half, but without a distinct white line above middle of coxal cleft. 689. CONSPURCATUS.
- hh.* Upper surface without scale-like hairs; lower half of face white; propleura white, black along its dorsal margin and with a clearly cut black line across lower half of coxal cleft. 690. DAVISI.
- gg.* Third antennal with a pale ring only at base, or none.
- i.* Joint 2 of antennæ broadly pale yellowish to dusky at middle, dark fuscous only at apex and next to pale ring at base; small slender species, length, 5—5.3 mm. 691. MINUTULUS.
- ii.* Joint 2 of antennæ black or fuscous-brown, a pale band at base, but (except in *tuberculatus*) only narrowly pale on middle.
- j.* Third antennal uniformly brownish-black.
- k.* Disk of pronotum with base and side margins black, the extreme basal edge pale, central area yellowish-green, often with a narrow median black streak, calli black; tibiæ brownish-black with vague pale spots; length, 8.5—9 mm. 692. JUNCUS.
- kk.* Disk of pronotum a nearly uniform reddish-brown, with only irregular fuscous markings near base; calli unicolorous with disk; tibiæ dull yellow tinged with fuscous, their tips alone blackish; upper surface with patches of long yellowish-white pubescence; length, 7—7.8 mm. 693. FENESTRATUS.
- jj.* Third antennal pale at base.

- l.* Lower half of head blackish without clearly marked white areas; length, 6.6 mm. 694. *CORTICEVIVENS*.
- ll.* Lower half of head chiefly white, sometimes with a black bar across middle of tylus, dorsal margin of juga and loræ dark reddish-black, but the white areas never obscured.
- m.* Corium with a longitudinal black stripe, set on a grayish background, along middle of apical half; joint 1 of antennæ equal in length to distance between tylus and basal margin of pronotum. 695. *VITATUS*.
- mm.* Corium without a longitudinal black stripe on a grayish background.
- n.* Joint 2 of antennæ with pale band placed at slightly beyond middle; tylus with a distinct black band across middle, its lower margin just in line with dorsal margins of loræ. 696. *DIMIDIATUS*.
- nn.* Joint 2 with pale band at middle; tylus without a heavy black band across middle, but often with a vague dark reddish spot at that point.
- o.* Pronotum strongly sulcate at sides and immediately behind calli; apical half of hind femora with three or four large pale marks, these often in part confluent. 697. *SULCATUS*.
- oo.* Pronotum not distinctly sulcate at sides or behind calli; hind femora black with not more than one prominent white band on apical half.
- p.* Hind femora brownish-black, apical half with small pale dots only; pale band at middle of second antennal subobsolete or wanting. 698. *FUMATUS*.
- pp.* Hind femora black with a distinct white oblique band just before apex; pale band at middle of second antennal very distinct. 699. *TUBERCULATUS*.

683 (922). *PHYTOCORIS LASIOMERUS* Reuter, 1909, 34.

Pale reddish-brown, rather thickly clothed with silky yellowish appressed hairs; pronotum with sides often clouded with fuscous, sometimes with a reddish tinge; clavus and corium vaguely clouded with fuscous, embolium usually paler; cuneus straw-yellow, its apex fuscous; membrane dusky, sprinkled with small vague yellowish spots, the veins reddish; legs dull yellow, the apical half or more of femora thickly flecked with reddish-brown; under surface reddish to fuscous-brown. Joint 1 of antennæ reddish-brown dotted with yellow, nearly two-thirds longer than pronotum; 2 as in key, about twice as long as 1; 3 paler at base, its apical half and all of 4 dusky, 3 two-thirds as long as 2, one-third longer than 4. Length, 7.5—8.5 mm. (Fig. 167, *a*).

Denver, Colo., July 16 (*Gerhard*). A species of northern distribution, ranging from Quebec and New England west to North Dakota, Colorado and Victoria, B. C. Not taken, but doubtless occurs in northern Indiana. It was found near Cranberry Lake, N. Y., in July and August on willows and weeds.

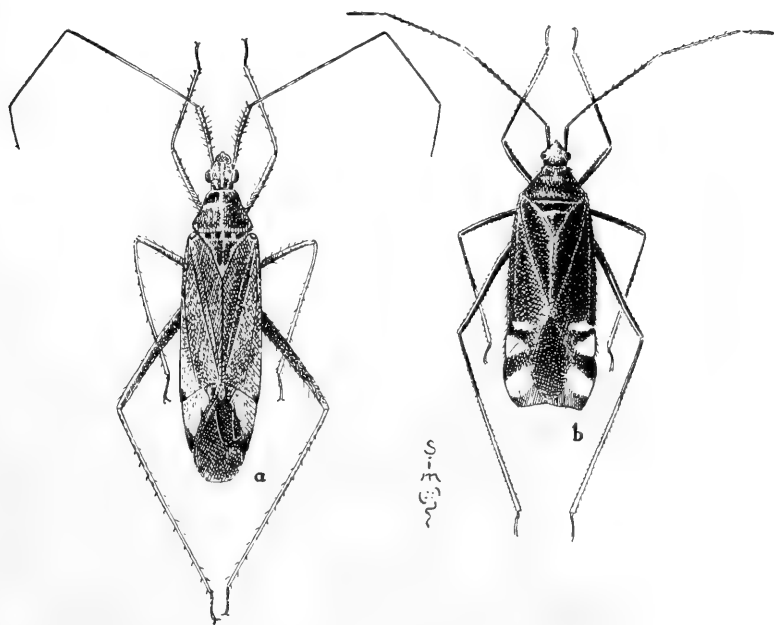


Fig. 167, *a*, *Phytocoris lasiomerus* Reut., X 6; *b*, *Macrotylus sexguttatus* (Prov.), X 12. (After Drake, Tech. Pub. No. 16, N. Y. St. Coll. For.).

684 (923). *PHYTOCORIS PALLIDICORNIS* Reuter, 1876, 69.

Pale brownish-yellow; elytra thickly flecked with reddish-brown spots and clothed with pale silky appressed hairs; extreme apex of cuneus brown; membrane pale fuscous flecked with whitish spots, the veins reddish; femora thickly sprinkled with reddish dots, apical third of hind ones with a yellowish band; tips of front and middle tibiae and base of hind ones reddish-brown. Joint 1 of antennae but slightly longer than pronotum, dull yellow, thickly flecked with reddish spots, pubescent as in key; 2 uniformly reddish-yellow, finely pubescent, much more slender and twice as long as 1; 3 dull yellow, fuscous at tip, about two-thirds the length of 2; 4 fuscous-brown, three-fourths the length of 3. Length, 6.4—6.8 mm.

Oak Bluffs, Mass., Aug. 3 (*Olsen*). Described from Wisconsin. Ranges from New England west to Colorado. Readily distinguished from *lasiomerus* by the much shorter basal antennal and wholly yellow second one.

685 (—). *PHYTOCORIS RUBROPICTUS* Knight, 1923, 619.

Elongate, slender, male; more oval, female. Dull reddish; elytra sparsely clothed with yellowish pubescence; pronotum with calli and quadrangular area on center of disk, yellowish, the disk beset with rather short blackish hairs, its margins with longer ones; clavus and

corium dull red, the claval vein and scattered spots on corium yellowish; membrane pale, flecked with small fuscous spots, these merging toward apex, veins reddish; legs dull yellow, femora with small vague reddish spots. Under surface reddish to yellowish, genital region tinged with fuscous. Joint 1 of antennæ dull yellow flecked with reddish, as long as pronotum; 2 much more slender, straw-yellow, brownish toward apex, one and three-fourth times the length of 1; 3 yellowish, dusky at tip, two-thirds as long as 2; 4 pale fuscous, three-fourths the length of 3. Length, 7.4—8 mm.

Known only from Maine and New York.

686 (—). *PHYTOCORIS ULMI* (Linnæus), 1758, 449.

Elongate, subparallel, male; elytra more oval, female. Brownish-red or reddish-yellow, rather thickly clothed with short yellow appressed hairs intermixed with suberect black ones; pronotum reddish-brown, basal edge yellowish-white, usually preceded by a transverse blackish spot; collar and side margins beset with black bristles; scutellum yellowish, its apical half with a brown spot each side; clavus reddish-brown, its outer margin often paler, tip blackish; corium brownish-yellow, flecked with reddish-brown, its apical fourth with a pale triangular spot; cuneus reddish or fuscous, its basal third paler; membrane smooth, hyaline, thickly flecked with small fuscous spots, veins reddish; front and middle femora pale brown with numerous scattered yellowish spots, hind ones dark brown flecked with whitish dots, the apical half with a pale half ring. Joint 1 of antennæ brownish with pale spots, one-fifth longer than pronotum; 2 and 3 yellowish-brown, 2 more than twice as long as 1, 3 two-thirds the length of 2; 4 fuscous, two-thirds as long as 3. Length, 6—7.5 mm.

Snowdonia and Sussex Co., England, July—Aug. (*British Mus. Coll.*). A European species recorded in this country only from Yarmouth, Nova Scotia. Occurs in Europe on elm, oak, brambles, etc.

687 (928). *PHYTOCORIS ANTENNALIS* Reuter, 1909, 32.

Fuscous to dull yellow; head brownish, base and apex of tylus white; pronotum brownish, basal third darker with hind margin narrowly white and calloused spots as in key; scutellum dull yellow to fuscous with a vague narrow pale median line; corium dull yellow with inner half and a median spot along outer margin fuscous; cuneus blackish along outer margin and apex, the inner basal angle and middle of inner margin each with a tuft of black hairs; membrane fuscous, mottled with numerous paler spots between the cells and opposite apex of cuneus; femora black, paler toward base, hind pair with lower face spotted with paler and upper one with a subapical pale band; front and middle tibiæ reddish to black, the former with three, the latter with four pale rings; hind tibiæ pale tinged with blackish, tarsi fuscous; under surface blackish, the sides unevenly tinged with reddish. Antennæ longer than body, joint 1 brownish-black flecked with paler spots on inner face; 2 twice the length

of 1, with a narrow pale ring in front of base and a broader one beyond middle; 3 brownish, paler at base, about two-thirds as long as 2; 4 fuscous, slightly shorter than 3. Genital segment of male with a broad erect tubercle above base of left clasper. Length, 5—6 mm.

Described from Washington, D. C. Recorded elsewhere only from Massachusetts, New York and New Jersey.

688 (941). *PHYTOCORIS PALMERI* Reuter, 1909, 32.

Sordid white, variegated with fuscous and black; pronotum with sides, narrow antebasal band and three stripes on disk blackish; scutellum shining black, basal angles and apical median line pale; elytra with clavus, inner half of corium and apex of cuneus blackish, margins of scutellum and commissure dirty white; membrane densely flecked with minute fuscous and whitish spots, the veins pale; under surface in great part blackish; femora blackish with pale lines on basal half, hind ones paler at base and with whitish spots on apical half; tibiæ and tarsi blackish, the apical half of tibiæ with three pale rings. Joint 1 of antennæ slender, linear, black, flecked with whitish; 2 with base black, a narrow white band behind middle. Length, 7 mm.

Known only from Quinze Lake, Quebec. Type in Van Duzee collection.

689 (—). *PHYTOCORIS CONSPURCATUS* Knight, 1920, 61.

Elongate, slender. Dull grayish-yellow mottled with fuscous and blackish spots and dots, and thickly clothed with black deciduous scale-like hairs, intermixed with small patches of yellowish floccose ones; corium with a triangular pale spot adjoining base of cuneus; membrane thickly flecked with dark fuscous spots; femora blackish with numerous white spots, the hind ones with two interrupted pale rings on apical half; tibiæ annulated with fuscous and pale; ventrals dark fuscous to blackish, the basal ones somewhat paler. Joint 1 of antennæ black, flecked with white, beset with numerous pale setæ, about four-fifths as long as pronotum; 2 black with a pale ring at base and another at middle, slightly more than twice as long as 1; 3 pale at base and again at middle, three-fifths the length of 2; 4 black, three-fourths the length of 3. Male with a long tubercle above base of left clasper, as shown in fig. 16. Length, 5.8—6 mm.

St. Anthony Park, Minn., Aug. 5 (*Minn. Univ. Coll.*). Ranges from Ontario and New England west to Michigan and South Dakota. Occurs from June to September on the bark of maple, linden and pear.

690 (—). *PHYTOCORIS DAVISI* Knight, 1923, 624.

Head dull white with a band across front and a line behind each eye, blackish; pronotum with side margins broadly black, calli, center of disk and collar in great part, pale brownish-yellow, hind margin narrowly

pale, preceded by a transverse row of black spots; scutellum yellowish tinged with fuscous and with a vague paler median line; clavus fuscous, its margin paler; corium dull yellow, its inner apical angle blackish, outer one paler; embolium blackish alternated with white spots; cuneus pale, apex and spot on middle of inner margin black; upper surface clothed with pale silky pubescence, intermixed with short black hairs; legs dull yellow, apical halves of femora with large black spots, front and middle tibiæ each with three black rings; hind tibiæ mottled with fuscous; ventrals yellowish-white, with pale pubescence. Joint 1 of antennæ black with a few pale spots, one and three-fourths times the length of pronotum; 2 black with a broad pale band at base and another at middle, nearly twice as long as 1; 3 blackish, paler at base and in front of middle, three-fifths as long as 2; 4 fuscous, two-thirds the length of 3. Length, 6.3 mm.

Known only from Long Island, N. Y., and Lakehurst, N. J.

691 (927). *PHYTOCORIS MINUTULUS* Reuter, 1909, 24.

Elongate, slender, subparallel. Brownish-yellow to fuscous, clothed with yellowish silken pubescence intermixed with short black hairs; basal edge of pronotum whitish preceded by dark fuscous; scutellum with a small fuscous dot each side near apex; elytra chiefly pale fuscous, flecked with minute spots of pale pubescence; clavus often paler on sides, corium with outer margin and anal ridge pale; embolium with small pale spots; cuneus with apex, spots on base and near middle of inner margin blackish; membrane flecked with fuscous and with two paler spots on outer margin, veins brownish; femora brownish-black, their base, numerous spots and subapical band paler; tibiæ fuscous, each with two or more pale rings; tarsi pale, their tips and basal segment dusky. Joint 1 of antennæ two-thirds longer than pronotum, reddish-brown flecked with paler, and beset with several pale setæ; 2 brownish-yellow, darker at tip and in front of basal pale ring, nearly twice as long as 1; 3 and 4 very slender, 3 pale at base, darker apically, two-thirds the length of 2; 4 pale fuscous, but little shorter than 3. Length, 5—5.5 mm.

Chautauqua, N. Y., Sept. 14 (*Van Duzee*). Known only from Massachusetts, Connecticut, New York and Maryland.

692 (—). *PHYTOCORIS JUNCUS* Knight, 1923, 621.

Head shining black beset with prominent brownish-black hairs, median line pale, vertex alutaceous each side; color of pronotum as in key; scutellum black, basal angles whitish; clavus dull yellow, its margins and claval vein black; corium black, a spot on middle and some streaks on inner apical half yellowish; embolium a uniform fuscous; cuneus black, paler on base; membrane dark fuscous, its middle paler with numerous more or less coalescent fuscous spots; ventrals brownish-black; femora blackish with pale spots, hind pair with an irregular pale subapical yellowish bar. Antennæ fuscous to black, joint 1 flecked with pale spots, finely pubescent and with several black setæ, but slightly longer than pronotum; 2 slender, cylindrical, two and three-fifth times as long as 1; 3 two-thirds the length of 2, twice as long as 4. Length, 8.5—9.2 mm.

Recorded only from Mt. Washington, N. Hamp., and Nordegg, Alberta.

693 (932). *PHYTOCORIS FENESTRATUS* Reuter, 1909, 24.

Elongate, slender, subparallel. Pale reddish-brown flecked with dull yellow; above thickly clothed with long yellowish prostrate hairs, intermixed with suberect blackish ones; scutellum with a large shining yellowish spot each side; corium with an elongate yellow spot near base, a larger one at middle and a smaller oval one near outer apical angle; embolium with numerous small yellow spots; cuneus yellowish at base; membrane with cells and apex fuscous, middle paler with numerous fuscous spots, veins reddish; prosternum, coxæ and middle of ventrals, yellow, remainder of under surface reddish-brown; femora yellow with numerous dull red dots. Joint 1 of antennæ as long as pronotum, dull yellow, rather thickly beset with short blackish hairs; 2 fuscous-brown, its extreme base paler, two and one-third times as long as 1; 3 and 4 fuscous brown, 3 three-fifths as long as 2, twice the length of 4. Length, 7—7.8 mm.

Clayton, Ga., May 18, beaten from pine (*Cornell Univ. Coll.*). Recorded elsewhere only from Connecticut, Washington, D. C., and North Carolina. The long slender form with antennals 2—4 fuscous-brown and without pale rings, except at base of 2, three yellow spots on corium and tibiæ devoid of pale rings, distinguish this species from its allies.

694 (—). *PHYTOCORIS CORTICEVIVENS* Knight, 1920, 63.

Elongate-oval. Head grayish-yellow with reticulate marks on vertex and several cross-bars each side of front, fuscous; pronotum in great part fuscous-brown, more distinctly so along basal margin, calli and middle of disk often paler; scutellum and elytra dull grayish-yellow with numerous vague irregular fuscous marks; embolium with numerous rather distinct cross-bars and tip of cuneus fuscous; membrane dull yellow, thickly flecked with fuscous dots, except on margins beyond tip of cuneus; femora fuscous-brown, narrowly pale at base, often with scattered pale dots; hind ones with a distinct oblique pale preapical ring; under surface fuscous-brown; lower half of head blackish, a pale spot at base of loræ. Antennæ fuscous-brown, with pale rings as in key, joint 1 three-fourths as long as head and pronotum united; 2 two and a half times as long as 1, 3 one-half as long as 2, 4 two-thirds the length of 3. Upper surface rather thickly clothed with short, prostrate yellowish hairs. Male genitalia as in fig. 6. Length, 6.5—7 mm.

Ramsey Co., Minn., June 2 (*Minn. Univ. Coll.*). Ranges from Quebec and New England west to Minnesota and southwest to Maryland; occurring in June and July in the crevices of the bark of sugar maple, *Acer saccharum* Marsh.

695 (937). *PHYTOCORIS VITTATUS* Reuter, 1909, 28.

Head dull yellow or pale fuscous with front obliquely marked with brown lines, both it and entire upper surface except membrane clothed with white sericeous scale-like pubescence; pronotum dull yellow to grayish, its sides fuscous with a sinuate black line next the pale outer edge, the pubescence of disk forming three pale stripes; scutellum fuscous with basal angles and side margins paler; clavus fuscous, paler along commissure; corium as in key; embolium pale yellow, its apex blackish; cuneus fuscous, its apex and inner margin blackish; membrane brownish-fuscous, its middle flecked with pale spots; middle and hind femora blackish, paler at base, the hind ones flecked with white dots; front tibiæ blackish with two pale rings. Joint 1 of antennæ reddish-fuscous marked with white spots, its length as in key; 2 fuscous with pale spots near base and a pale ring at middle, one and two-fifths times as long as 1; 3 fuscous with pale ring at base, as long as 1. Beak reaching fifth ventral.

Known only from Lake Placid, N. Y.

696 (—). *PHYTOCORIS DIMIDIATUS* Kirschbaum, 1855, 199, 282.

Grayish-yellow clothed with short yellowish and blackish pubescence; head brownish-yellow, its front with oblique brownish lines each side and cheeks with a black spot at base; pronotum dull greenish-yellow, hind margin pale; median line behind calli and narrow side and subbasal margins blackish; scutellum brown, basal angles and subapical spot each side darker, median line and tip pale; elytra blackish, the base and middle of corium and inner margins of clavus paler, embolium pale, with black spots; cuneus yellowish with apex and spots on inner margin blackish; membrane pale, irregularly and thickly flecked with fuscous, the base of large cell black; hind femora black with numerous spots and subapical band pale; tibiæ black with pale rings. Joint 1 of antennæ about one-third longer than pronotum, brownish black with numerous pale glabrous spots; 2 nearly twice as long as 1, blackish with pale ring at base and another slightly beyond middle; 3 black, pale at base, three-fifths the length of 2; 4 black, two-thirds as long as 3. Length, 6.4–7 mm.

A European species known in this country only from Nova Scotia.

697 (—). *PHYTOCORIS SULCATUS* Knight, 1920, 64.

Elongate-oval. Dull brownish-yellow, more or less tinged with fuscous; pubescent as in *fumatus*; outer half of clavus, inner half or less of corium and inner half of cuneus fuscous or blackish; femora pale at base, their apical halves flecked with large pale spots. Joint 1 of antennæ blackish with pale dots, as long as pronotum; 2 with distinct pale annulations at base and middle, twice as long as 1; 3 brownish-yellow, with a narrow pale ring at base, two-thirds as long as 2; 4 yellowish, two-fifths the length of 3. Male genitalia as in fig. 15; a large thick tubercle above base of left clasper. Length, 6 mm.

St. Anthony Park, Minn., Aug. 5 (*Minn. Univ. Coll.*). Ranges from New England west to Minnesota. Occurs on the bark of linden and bur oak.

698 (938). *PHYTOCORIS FUMATUS* Reuter, 1909, 25.

Grayish-fuscous clothed with short subappressed blackish hairs and with scattered spots of longer whitish ones; vertex with a large alutaceous spot each side, front with oblique lines each side and a bar between bases of antennæ, reddish or blackish; pronotum fuscous-brown, calli paler, narrow basal margin pale, preceded by a transverse row of four or six small blackish pilose spots; scutellum fuscous-brown with apex pale, basal angles, and a subapical spot each side, blackish; elytra fuscous to blackish, corium with a rhomboid translucent yellowish spot near inner apical angle, this preceded by an oblique black bar; membrane pale, thickly and rather evenly flecked with brownish-fuscous spots, the apex and a spot near tip of cuneus pale; under surface blackish, paler at middle, coxæ yellow; femora pale at base, their apical halves blackish with pale spots, front and middle tibiæ dull yellow, annulate near knees

with black, hind ones black, the middle third pale, tarsi fuscous. Antennæ blackish-brown joint 1 as long as pronotum and half of head, its upper face with pale spots; 2 almost twice the length of 1, its extreme base and often a spot near middle pale; 3 pale at base, about three-fifths as long as 2; 4 nearly one-third shorter than 3. Male genitalia as in fig. 8. Length, 7—7.6 mm.



Sherborn, Mass., Sept. 6 (*Frost*). Ranges from Massachusetts and New York southwest to Washington, D. C. Knight (1920, 64) states that the type of *Phytocoris subnitidulus* Reut. (1909, 26) in the U. S. National Museum is identical with that of *P. fumatus* Reut., the latter name having page priority.

699 (—). *PHYTOCORIS TUBERCULATUS* Knight, 1920, 64.

Fig. 168. *Phytocoris tuberculatus* Knight, X 5.
(Original).

Brownish-yellow, more or less thickly mottled with fuscous; disk of pronotum with some vague spots and a distinct zig-zag transverse line just in front of hind margin, fuscous, edge of hind margin white; clavus, inner half of corium, and apical half of cuneus clouded with fuscous;

membrane dusky with numerous minute white dots; basal joint of antennæ and apical three-fourths of femora fuscous, thickly flecked with small yellow spots; tibiæ and second antennal annulate with pale yellow and fuscous; lower part of face, middle of prosternum and basal third of femora ivory-white. Joint 1 of antennæ equal in length to distance be-

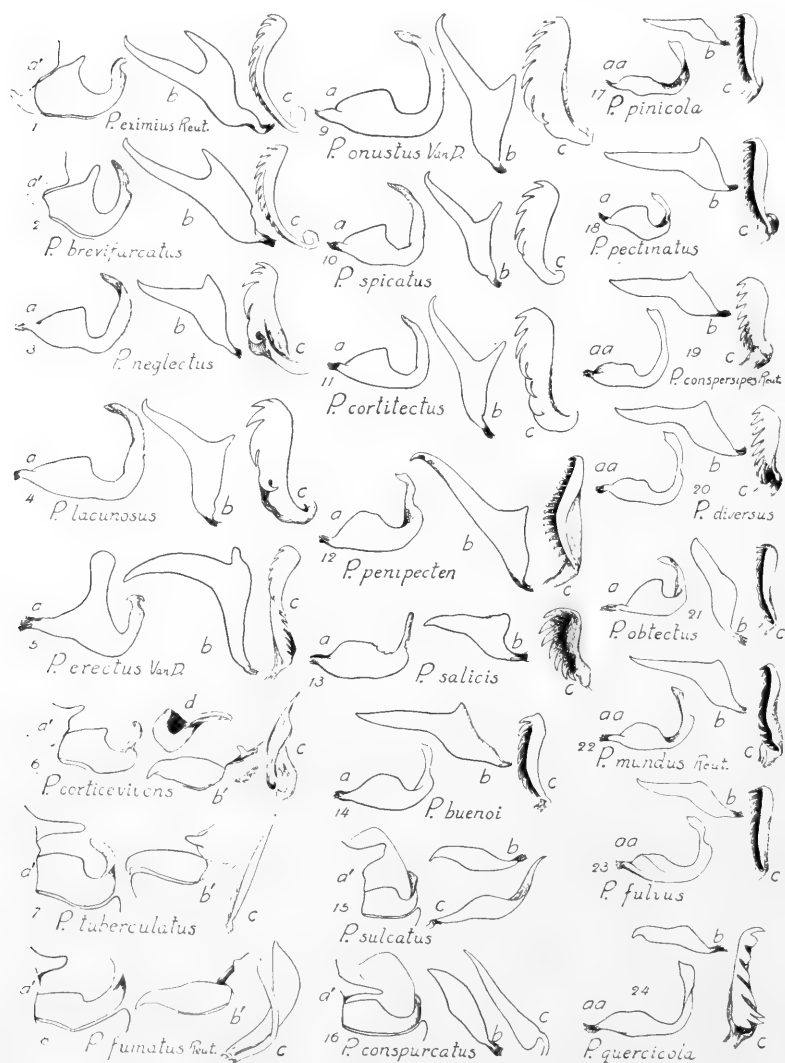


Plate XI. MALE GENITALIA OF SPECIES OF PHYTOCORIS.

a, Left clasper, side view; aa, left clasper, dorsal view; b, right clasper, side view; c, flagellum; d, left clasper, caudal view.

(After Knight, Hemiptera of Connecticut).

tween base of pronotum and a line drawn through middle of eyes, 2 twice the length of 1, 3 two-thirds the length of 2, one-third longer than 4. Disk of pronotum finely and sparsely granulate. Male genitalia as in fig. 7. Length, 6.5—7.5 mm. (Fig. 168).

Marion Co., Ind., June 14—Aug. 19, swept from herbage in dense woodland. Recorded from New York, Michigan and North Carolina.

GROUP II.—PHYTOCORIS.

In this group the membrane is wholly pale or dusky translucent without distinct spots or dots, and the basal joint of antennæ is shorter than the width of head across the eyes. It corresponds to the Group III of Knight in the "Hemiptera of Connecticut," and comprises eight of our eastern species. They average smaller than those of Group I and for the most part breed on pine.

KEY TO EASTERN SPECIES OF GROUP II, PHYTOCORIS.

- a.* Elytra a nearly uniform pale reddish or reddish-yellow; embolium and cuneus yellowish-translucent; length, 4.2—4.7 mm.
700. MUNDUS.
- aa.* Elytra not uniformly reddish-yellow.
- b.* Elytra pale yellow to fulvous; clavus not darker than corium.
- c.* Femora with pale spots very small or subobsolete; color pale yellowish, the outer half of clavus and inner half of corium reddish-yellow; cuneus yellowish-translucent, reddish-yellow toward apex; length, 5.5—6 mm.
701. FULVUS.
- cc.* Femora with distinct pale spots, but if not, then inner half of cuneus distinctly rosaceous.
- d.* Scutellum almost wholly yellowish to reddish, never distinctly paler on median line or apex.
- e.* Upper surface in great part rosaceous, outer half of corium pale translucent; smaller, length not more than 4.5 mm.
702. RUFUS.
- ee.* Upper surface in great part a pale yellowish-brown, the base of cuneus sometimes tinged with reddish; larger, length, 5.2 or more mm.
- f.* Second antennal distinctly darker near apex; width of vertex in male greater than longer diameter of eye.
703. UNIFORMIS.
- ff.* Second antennal a uniform pale brown; width of vertex in male distinctly less than longer diameter of eye.
704. MEGALOPSIS.
- dd.* Scutellum reddish-yellow each side of middle, its median line and apex distinctly paler; clavus and inner half of corium reddish or reddish-brown; cuneus with inner half rosaceous.
705. DIVERSUS.

- bb.* Elytra more nearly brown or fuscous than yellowish, irregularly tinged with reddish; clavus darker than outer portion of corium.
g. Hind femora fusco-reddish, flecked with distinct small whitish spots, these never forming a distinct subapical band.

706. *CONSPERSIPES.*

- gg.* Hind femora fuscous with small yellowish spots, the dorsal surface with a rather broad subapical band or transverse pale spot.

707. *PINICOLA.*

700 (958). *PHYTOCORIS MUNDUS* Reuter, 1909, 18.

Elongate-oblong, subparallel. Color a nearly uniform pale dull yellow, more or less tinged with reddish, rather thickly clothed with fine silken yellowish appressed pubescence; embolium and disk of cuneus pale yellow, the margins of cuneus reddish; membrane pale dusky translucent, its veins yellowish; tarsal claws, tip of beak, apical two-thirds of second antennal and all of third and fourth antennals fuscous. Joint 1 of antennæ about as long as pronotum behind the collar, 2 nearly three times as long as 1, 3 about two-fifths shorter than 2, one-fifth longer than 4. Male genitalia as in fig. 22. Length, 4.2—4.7 mm.

District of Columbia, June 25—July 6 (*Gerhard*). Recorded only from there, New Jersey and Maryland. Breeds on the Jersey or scrub pine, *Pinus virginiana* Mill.

701 (—). *PHYTOCORIS FULVUS* Knight, 1920, 59.

Larger, more elongate and somewhat paler than *mundus*. Color as in key; apex of second antennal fuscous, third and fourth wholly blackish; membrane a uniform pale translucent with a faint dusky tinge. Male genitalia as in fig. 23. Length, 5.5—6 mm.

Wanakena, N. Y., Aug. 1—7 (*Gerhard*). Pineland, Long Island, N. Y., Aug. 11 (*Davis*). Recorded only from Maine and New York. Occurs on the white pine, *Pinus strobus* L.

702 (957). *PHYTOCORIS RUFUS* Van Duzee, 1912a, 477.

Elongate-oval. General color rosaceous on a pale yellow background, sparsely clothed with suberect brownish hairs; vertex and front yellow with red markings; pronotum with disk dull yellow, basal submargin with a transverse dusky line, the hind edge paler; scutellum with a few small vague yellowish spots; embolium and basal half of cuneus yellowish translucent, the costal edge with red markings; membrane a uniform pale dusky hyaline; legs and first antennal in great part dark reddish, mottled with yellow, remainder of antennæ fuscous-brown, the extreme base of segments 2 and 3 pale; basal third of femora and coxæ yellow; ventrals pale brown tinged with reddish. Joint 1 of antennæ about as long as width of vertex and one eye; 2 three times longer than 1, 3 two-fifths as long as 2; 4 slightly shorter. Length, 4.3—4.5 mm.

Dunedin, Fla., Jan. 17; beaten from foliage of bay. The types were from Sevenoaks, near Clearwater, Fla., and were

“swept from coarse grasses in a swampy opening in the pine forest.” Not recorded elsewhere.

703 (—). *PHYTOCORIS UNIFORMIS* Knight, 1923, 643.

Elongate-oblong. Uniform pale brownish-yellow, rather thickly clothed with golden-yellow recumbent pubescence, intermixed with suberect pale brown hairs, eyes pale brown; femora and first antennal pale yellow, rather thickly flecked with reddish-brown spots and dots; second antennal greenish-yellow, fuscous toward apex; membrane uniformly pale dusky translucent; hind femora with a large yellow spot or ring on apical fourth. Basal joint of antennæ four-fifths as long as width of head, 2 two and two-fifths longer than 1, apical segments missing. Length, 5.2—5.5 mm.

Long Island, N. Y., Sept. 8 (*Davis*). Rocky Mountain, N. Car., Aug. 25 (*Brimley*). Recorded only from Massachusetts and New York.

704 (—). *PHYTOCORIS MEGALOPSIS* sp. nov.

Elongate, subparallel. Color above a nearly uniform fuscous-brown, thickly clothed with fine whitish appressed silky hairs and suberect dusky ones; vertex and lower half of face dull yellow; loræ tinged with reddish; eyes deep black, very large in male; collar and hind edge of pronotum whitish; costal margins of elytra and cuneus with alternate minute fuscous and white spots; inner margin of cuneus with two submedian black dots; membrane pale translucent with an iridescent sheen; femora and joint 1 of antennæ dull yellow, thickly flecked with reddish-brown spots and dots, third and fourth antennals fuscous, the former with extreme base pale; tip of beak, tarsal claws and tibial spines fuscous-brown; under surface pale reddish-brown, middle of prosternum and front coxæ ivory-white. Joint 1 of antennæ as long as width of vertex and one eye, 2 three and a half times as long as 1, 3 two-fifths the length of 2, one-third longer than 4. Sides of elytra straight and parallel to base of cuneus, thence feebly converging into the conjointly broadly rounded tips. Length to end of membrane, 5.5 mm.

Dunedin, Fla., April 20, one male taken at electric light. Due to the very large eyes the width of interocular area is but slightly more than one-half that of *uniformis*. The large coal-black eyes, uniform hue of second antennal and alternate maculation of costal margin easily separate this from the other members of Group II.

705 (—). *PHYTOCORIS DIVERSUS* Knight, 1920, 60.

Elongate, subparallel, more slender than *consersipes*. Head, pronotum and under surface greenish-yellow, the sides of tylus, margins of cheeks, oblique striæ on front, sternum and sides of ventrals usually tinged with reddish-brown; femora and tibiæ reddish-brown, mottled with paler. Joint 1 of antennæ greenish-yellow tinged with brownish, mottled with paler on inner side, one-fourth shorter than width of head;

2 fuscous, paler at base, nearly three times as long as 1; 3 and 4 blackish, 3 one-half the length of 2, one-fourth longer than 4. Male genitalia as in fig. 20. Length, 5 mm.

Carlton Co., Minn., Aug. 18 (*Minn. Univ. Coll.*). Occurs on white pine, its known range extending from Maine to Minnesota.

706 (954). *PHYTOCORIS CONSPERSIPES* Reuter, 1909, 22.

Elongate-oblong, subparallel. Head and pronotum dull yellow, the former thickly flecked with small reddish spots, the latter with a reddish tinge and beset with numerous suberect black hairs; scutellum and elytra rather dark reddish-brown, the former with yellowish tip, the latter with widely scattered small vague yellowish spots, both rather thickly clothed with fine appressed yellowish pubescence; membrane of a uniform dusky hue throughout; femora and basal antennal dark reddish flecked with numerous small yellow dots, remainder of antennæ fuscous-brown; joints 2 and 3 narrowly pale at base; tarsi more or less fuscous; basal joint of beak with a red line each side. Joint 1 of antennæ three-fourths the length of pronotum, 2 nearly three times the length of 1, 3 one-half the length of 2, but slightly longer than 4. Male genitalia as in fig. 19. Length, 4.7—5 mm.

Reading, Pa., and Rock Creek, D. C., June 22—Aug. 14 (*Gerhard*). Swannanoa, N. Car. (*Brimley*). Heretofore recorded only from New Jersey, Maryland and District of Columbia. Breeds on the scrub pine, *Pinus virginiana* Mill.

707 (—). *PHYTOCORIS PINICOLA* Knight, 1920, 59.

Elongate-oval. Head and pronotum greenish-yellow tinged with reddish-brown; scutellum, clavus and corium pale reddish-fuscous; embolium and cuneus dull greenish-yellow with a reddish tinge; femora and tibiæ fuscous-brown, thickly flecked with minute yellowish dots. Joint 1 of antennæ brownish, annulate or marked above with paler glabrous spots, its length less than three-fifths the width of head; 2 fuscous-brown, paler beneath, nearly three and two-third times as long as 1; 3 blackish, narrowly pale at base, about as long as width of head; 4 blackish, slightly more than half the length of 3. Male genitalia as in fig. 17. Length, 5.2 mm.

Ithaca, N. Y., July 11 (*Minn. Univ. Coll.*). Recorded only from Massachusetts and New York. Breeds on the gray and red pines, *Pinus silvestris* L. and *P. resinosa* Ait.

GROUP III.—PHYTOCORIS.

This group includes species of small or medium size having the membrane unflecked though sometimes with pale areas near middle, and the antennæ in great part blackish or fuscous

with basal joint longer than greatest width of head. It corresponds to Group II of Knight in the "Hemiptera of Connecticut," and comprises 20 of our eastern species.

KEY TO EASTERN SPECIES OF GROUP III, PHYTCORIS.

- a.* Vertex with a shallow but distinct median longitudinal impression; joint 1 of antennæ stout, twice as thick throughout as 2; form very slender.
- b.* Corium with a conspicuous round white spot near apex. 708. BIPUNCTATUS.
- bb.* Corium without a white spot near apex. 709. ANNULICORNIS.
- aa.* Vertex without a median longitudinal impression; joint 1 of antennæ never twice as thick as joint 2; form more robust.
- c.* Corium with a distinct black or dark fuscous mark extending obliquely from radius to the inner apical angle of corium, this dark mark never broken by paler spots.
- d.* Disk of pronotum uniformly deep black with only the narrow basal margin pale; scutellum yellowish with an oblique black mark near middle each side of median line; length, 5.1 mm. 710. NIGRICOLLIS.
- dd.* Disk of pronotum pale grayish to blackish, always paler on middle and never deep black.
- e.* Scutellum with distinct blackish mark each side of apical half which extends from the side margin forward to near middle of scutellar disk.
- f.* Pale color on lower margin of propleura extending upon sides of sternum.
- g.* Tylus in great part blackish; femora black except at base, their pale spots small, the largest on hind femora not wider than the narrow pale band at apical fourth; length 5.1 mm. 711. HUSSEYI.
- gg.* Tylus wholly pale; hind femora in great part pale, the apical fourth and some scattered spots fuscous-brown enclosing pale dots; length, 6 mm. 712. ALBITYLUS.
- ff.* Pale color on lower margins of propleura not extending upon sides of sternum.
- h.* Hind femora with large irregular pale spots on front face, the spots connected by a longitudinal pale bar which does not reaching subapical pale band; length, 7—7.4 mm. 713. ONUSTUS.
- hh.* Hind femora with small spots and without a distinct longitudinal bar on front face.
- i.* Membrane with the infuscation on its central area tending to separate into small specks; front of head transversely striate with black lines each side of median line; length, 6.2 mm. 714. NEGLECTUS.
- ii.* Membrane more uniformly dusky, its central area without specks; front of head not distinctly striate with black, though reddish or fuscous lines sometimes evident; length, 6—6.8 mm. 715. SPICATUS.

- ee.* Scutellum with black spot on margin each side of apical half, but this scarcely longer than broad, not reaching more than half way to middle of disk; length, 5.4—5.9 mm.
- j.* Hind femora with a distinct white band near apical fourth and usually with large pale spots near middle.
- k.* Second antennal pale or yellowish above, darker near apex and next to pale ring at base; scutellum and clavus clothed with suberect yellowish or fuscous hairs intermingled with short sericeous white pubescence; center of membrane somewhat fuscous. 716. EXIMIUS.
- kk.* Second antennal dark brown or black except at base; pronotum, scutellum and clavus clothed with black hairs, intermixed with conspicuous white sericeous pubescence. 717. BUENOI.
- jj.* Hind femora without a distinct white band near apical fourth, the pale spots near middle small.
- l.* Corium with conspicuous triangular black mark set obliquely across its apex; cuneus usually reddish. 718. ERECTUS.
- ll.* Corium with a light, almost interrupted fuscous mark set obliquely across its apex; cuneus rarely if ever reddish. 720. BREVIFURCATUS.
- cc.* Corium without a distinct black mark across its apical area, this area sometimes fuscous but the dark color broken by paler spots, but if not, the black color on radius distinctly darker than the oblique infuscation.
- m.* Corium distinctly greenish on apical half; second antennal black with pale ring at base.
- n.* Length, 5.1—5.5 mm. 721. PENIPECTUS.
- nn.* Length, 4.8 mm. 722. PECTINATUS.
- mm.* Corium not distinctly green.
- o.* Elytra more brownish than black; dark color on middle of clavus and apical area of corium broken into small spots; pubescence chiefly golden-brown; length, 6 mm. 723. SALICIS.
- oo.* Elytra sometimes brownish but the dark color not broken into small spots.
- p.* Front and vertex pale to yellowish, not distinctly marked with blackish, rarely with short red lines near each eye; scutellum pale to yellowish with a small submarginal brown or fuscous spot each side near apical fourth; length, 6.2 mm. 724. ANGUSTULUS.
- pp.* Front and vertex transversely marked with blackish lines.
- q.* Scutellum chiefly brownish-black, irregularly spotted with paler, its median line narrowly pale but irregularly invaded with the darker color; length, 5.5 mm. 725. OBTECTUS.
- qq.* Scutellum chiefly pale to grayish but with a black mark each side on apical half.
- r.* Corium with a longitudinal pale area which extends upon base of cuneus without interruption by an oblique infuscation; radius with a black line which curves outward apically to the base of cuneus; length, 6.7 mm. 726. LACUNOSUS.

- rr.* Corium distinctly darkened with fuscous on apical half, scarcely showing paler by contrast with dark marks along radius; length, 6 mm. 727. CORTITECTUS.

708 (929). PHYTOCORIS BIPUNCTATUS Van Duzee, 1910, 77.

Elongate, very slender, subparallel. Head fuscous-brown with a reddish tinge, the tylus paler; pronotum with apical half reddish-brown, basal half fuscous-brown, its extreme hind margin with a sinuate white line interrupted by small tufts of short black hairs; scutellum reddish-brown, vaguely flecked with yellow; elytra fuscous-brown, the costal margin with small alternate gray and fuscous spots; corium with pale spot near apex; membrane uniformly dusky, feebly iridescent; femora fuscous-brown, reddish-yellow at base, front tibiæ reddish-brown, with three conspicuous pale yellow rings; ventrals fuscous, pro- and mesosterna dull yellow with a reddish tinge. Antennæ longer than body, joint 1 dark brown with two or three yellow spots, slightly shorter than basal width of pronotum; 2 dark brown with two pale rings, twice the length of 1; 3 two-thirds the length of 2, pale, with brown pale ring at base and another near middle; 4 very slender, fuscous, slightly shorter than 1. Length, 4.2—4.7 mm.

Dunedin and Kissimmee, Fla., Dec. 19—April 1. Taken in spring by sweeping grasses and herbage in pine woods and along margins of ponds; hibernates in winter beneath boards and other cover near ponds. Described from Florida and, according to Van Duzee: "Common on the dry sparse grasses in the pine barrens everywhere south of Sanford."

709 (930). PHYTOCORIS ANNULICORNIS (Reuter), 1876, 70.

Form and size of *bipunctatus*. Reddish-brown tinged with fuscous; joints 1 and 2 of antennæ reddish-fuscous, 1 with numerous pale spots, 2 with two pale rings; 3 and 4 testaceous, 3 with two paler rings; under surface fuscous, sterna and legs reddish-brown, the femora fuscous towards apex; tibiæ with three fuscous rings, those on hind tibiæ more or less confluent. Length, 5 mm.

Described from Texas. Recorded by Parshley from Maine and Massachusetts, and by others from Pennsylvania, Ohio, Colorado and California. Knight (Ms.) considers *bipunctatus* a synonym of *annulicornis*, but neither Reuter nor Distant in their descriptions of *annulicornis* mention the prominent pale spot on corium, distinctive of *bipunctatus*.

710 (—). PHYTOCORIS NIGRICOLLIS Knight, 1923, 636.

Male—Elongate, subparallel. Head dull yellow; apical half of tylus, loræ except tips, bucculæ and mark behind eye blackish; color of pronotum and scutellum as in key, both they and elytra clothed with

black hairs intermixed with tufts of silky yellowish pubescence; clavus yellowish, fuscous at middle; corium black, the base, spot at middle and another near base of cuneus, pale; embolium black with spots near base and middle, pale; cuneus yellowish, apex and inner margin black; membrane blackish, a small spot near tip of cuneus and another at apex of larger cell, white; femora black flecked with yellowish, their bases pale; front and middle tibiæ pale, annulate with black, hind ones black with broad pale ring on basal third; ventrals deep black, the basal ones yellowish at middle. Joint 1 of antennæ dull yellow, above black with yellow spots, as long as pronotum; 2 and 3 black with pale ring at base, 2 two and three-fifth times as long as 1, nearly twice the length of 3; 4 black, one-fifth shorter than 3. Beak reaching fifth ventral. *Female*—With costal margins more curved, elytra more broadly pale; antennal joints relatively longer. Length, 5—5.2 mm.

Recorded only from New Hampshire and North Carolina, but probably has a much wider range.

711 (—). *PHYTCORIS HUSSEYI* Knight, 1923, 639.

Elongate, subparallel. Head yellowish with reddish to black marks on front, tylus and loræ; pronotum and scutellum yellowish marked with darker as in key; clavus blackish with paler brown or fuscous spots; corium with apical third fuscous, black spot opposite base of membrane and a pale one that of cuneus, both corium and clavus clothed with short erect black hairs intermixed with tufts of whitish silken tomentose pubescence; membrane fuscous, darker at base; hind femora with a narrow subapical pale ring. Joint 1 of antennæ black, flecked above with large and small whitish spots, about one-fifth longer than width of head across eyes, 2 and 3 black, pale at base, 2 twice as long as 1, two-thirds longer than 3; 4 black, as long as 1. Beak reaching fourth ventral. Length, 5.1 mm.

Known only from Mercer County, Ohio.

712 (—). *PHYTCORIS ALBITYLUS* Knight Ms.

Elongate, subparallel. Head dull whitish-yellow; loræ and a few vague marks on vertex fuscous; pronotum dull yellow, an impressed dot behind each callus and a narrow prebasal zigzag line fuscous-brown, basal margin narrowly whitish, propleuræ and middle of mesoscutum dull black; scutellum dull yellow with fuscous marks as in *e* of key; elytra dull yellow, clavus, claval suture and inner margin of corium in great part fuscous-brown; apex of corium with an oblique dark bar as in *c* of key; embolium fuscous, flecked with scattered pale dots; cuneus dull yellow, the tip and some small spots along inner margin fuscous; membrane fuscous-hyaline marbled with paler, the large cell with a few small fuscous dots; femora as in *gg* of key; tibiæ and tarsi fuscous, the former with two broad pale rings; under surface dull black, sterna straw-yellow. Joint 1 of antennæ blackish, with numerous large white dots, as long as pronotum; 2 and 3 blackish-brown, each narrowly pale at base, 2 twice as long as 1, 3 two-fifths the length of 2, 4 missing. Eyes of male very large, the interocular area only one-half their long diameter.

Pronotum two-thirds wider at base than long at middle, its basal half somewhat flaring. Length, 6 mm.

Dunedin, Fla., March 17. One male beaten from wax-myrtle, *Myrica cerifera* L.

713 (—). PHYTOCORIS ONUSTUS Van Duzee, 1920, 344.

Elongate, subparallel. Head dull yellow, cheeks, tip of tylus and six oblique lines each side of front, fuscous; pronotum with sides and basal third broadly blackish, the latter area interrupted at middle, hind margin whitish, in female preceded by a transverse row of six black spots; scutellum pale with stripe each side and basal angles blackish; elytra fuscous, vaguely irrorate with pale, the corium with polished paler areas at base, middle and near apex; cuneus fuscous; membrane pale fuscous, a pale spot near tip of cuneus and two vague ones on disk, veins fuscous; hind femora as in key; tibiæ fuscous with three or four pale rings. Antennæ fuscous, joint 1 flecked with paler, as long as pronotum and half of head; 2 paler at base, two and one-half times longer than 1; 3 with base and extreme tip pale, 3 and 4 united equal to 2; 3 longer than 1, 4 shorter. Beak passing hind coxæ. Male genitalia as in fig. 9. Length, 7—7.4 mm.

Ranges from New England west to New York. Occurs on bark of hickory in moist shaded localities.

714 (—). PHYTOCORIS NEGLECTUS Knight, 1920, 54.

Elongate, subparallel. Head dull yellow, vertex with reddish markings; apex of tylus and two or three short bars on cheeks and loræ fuscous-brown; pronotum dull yellow tinged with reddish, sparsely clothed with sub-erect fuscous hairs, hind margin pale yellow, this hue bordered in front by a transverse row of six or eight small oblong fuscous-brown spots; scutellum dull yellow with fuscous marks as in *e* of key; elytra fuscous-brown with scattered vague paler areas, embolium pale yellow with a few small dark spots, apical third of corium with an oblique fuscous bar as in *c* of key; membrane fuscous with paler areas near middle; legs straw-yellow, apical halves of femora flecked with fuscous, tibiæ thrice annulate with fuscous-brown; under surface pale yellow along median line, the sides with a wide dark brown unbroken stripe extending from behind eye to tip of abdomen. Joint 1 of antennæ pale yellow with numerous fuscous marks, subequal in length to width of pronotum at base; 2 and 3 uniformly blackish-fuscous, each narrowly pale at base; 2 more slender and two and a third times longer than 1, 3 one-half as long as 2, one-third longer than 4. Beak reaching third ventral. Male genitalia as in fig. 3. Length, 6.2—6.5 mm.

Woods Hole and Pigeon Cove, Mass., July 15—30 (*Olsen*). Ranges from New England west to Michigan and South Dakota. Occurs on the bark of apple and other trees where it is probably predaceous on the larvæ of various insects. Beaten from hazel by Hussey.

715 (—). *PHYTOCORIS SPICATUS* Knight, 1920, 55.

Elongate, subparallel. Head and middle of apical half of pronotum greenish-white, the former with vague narrow transverse fuscous or reddish lines between the eyes and two broader zigzag ones on front. Remainder of pronotum, clavus and corium dull fuscous-black with vague paler markings; scutellum greenish-yellow with an oblique black line each side of apical half; embolium dull yellow with black spots; cuneus with basal half greenish-yellow, apical half fuscous; femora greenish-yellow, their apical halves with black spots, hind ones with preapical pale ring; tibiæ annulate with fuscous and dull white; under surface greenish-white with a broad blackish stripe along each side. Joint 1 of antennæ blackish with white spots, three-fourths as long as head and pronotum united; 2 and 3 fuscous-brown, both narrowly pale at base, 2 two and one-half times as long as 1; 3 two-fifths the length of 2; 4 dusky, two-thirds as long as 3. Male genitalia as in fig. 10. Length, 6—6.8 mm.

Norman Co., Minn., June 25 (*Minn. Univ. Coll.*). Recorded from New England and New York.

716 (934). *PHYTOCORIS EXIMIUS* Reuter, 1876, 67.

Elongate, suboval. Dull greenish-yellow with numerous fuscous and reddish marks, thinly clothed with suberect pale or fuscous hairs and prostrate yellowish ones; head marked with numerous oblique blackish-lines and reddish dots; pronotum with middle of front lobe greenish-yellow marked with reddish, remainder of disk clouded with fuscous and with an undulate or interrupted fuscous line across basal fifth, this edged behind with paler; scutellum greenish-yellow, the extreme base and a short oblique spot each side near apex, fuscous; elytra with numerous small fuscous spots, the corium with a conspicuous oblique blackish bar across its apical fourth; tip of cuneus and cells of membrane fuscous; femora and second antennal colored as in key; tibiæ annulate with brown and yellow; under surface greenish-yellow with a broad black stripe on sides; genital area fuscous. Joint 1 of antennæ reddish-brown with paler dots, about one-third longer than pronotum; 2 more than twice as long as 1, 3 three-fifths the length of 2, slightly more than one-fourth longer than 4. Beak reaching fourth ventral. Male genitalia as in fig. 1. Length, 5.8—6.2 mm.

Marion Co., Ind., June 26—Sept. 2 (*W. S. B.*). Hessville, Lake Co., Ind., July 1; S. Maywood, Ill., Aug. 3 (*Gerhard*). Raleigh, N. Car., Sept. 27 (*Brimley*). Ranges from Quebec and New England west to the Pacific and southwest to Florida, Texas, Mexico and the West Indies. Recorded from Crescent City and Jacksonville, Fla. Variable to some extent in depth of color, according to habitat and maturity. Occurs mainly on grasses in waste places; also on foliage of ash and hickory, and said to be in part predaceous.

717 (—). *PHYTOCORIS BUENOI* Knight, 1920, 57.

"Resembles *eximius* but colors of dorsum more in contrast; front and middle femora dark fuscous-brown, closely and irregularly maculated with pale; black patch bordering cubitus strongly contrasted with the pale spot adjoining base of cuneus, pale part of cuneus tinged with roseous; central area of membrane distinctly pale. Male genitalia as in fig. 14, distinctive of the species. Length, 5.8 mm." (*Knight*).

New Haven, Conn., June 27 (*Walden*). Recorded from Massachusetts, Connecticut and New York. Occurs on Norway spruce.

718 (—). *PHYTOCORIS ERECTUS* Van Duzee, 1920, 345.

Elongate, subparallel. Dull greenish-yellow with fuscous-brown markings; scutellum with blackish marks as in *ee* of key; stripe on disk of clavus and another on corium along claval suture, fuscous; apex of corium with a conspicuous polished pale spot, preceded by a black mark as in *l* of key; cuneus with outer basal portion dull yellow, remainder reddish flecked with fuscous, its inner margin with two black points; membrane pale fuscous, with a double subhyaline pale mark behind apex of cuneus and another in the larger cell; hind femora as in *jj* of key, though often with a rather distinct pale subapical ring; under surface greenish-yellow, the sides and genital segment mostly black. Joint 1 of antennæ brown with pale dots, one-third longer than width of head across eyes; 2 brownish-yellow, narrowly pale at base, slightly more than twice as long as 1; 3 dusky yellow, pale at base, one-half the length of 2; 4 fuscous, four-fifths as long as 3. Genitalia of male as in fig. 5. Length, 5.4—6 mm.

Norman Co., Minn., July 17 (*Minn. Univ. Coll.*). Ranges from Ontario and New England west to Minnesota.

719 (—). *PHYTOCORIS CANADENSIS* Van Duzee, 1920, 346.

"Very close to *erectus*, but with distinct genital characters and the pale ventral area more widened posteriorly, covering the entire last ventral; genital segment fuscous each side, the median line and apex pale. Sinistral male clasper with its dorsal hook hardly half as long as in *erectus*, triangular as viewed from before and acute at apex; dextral clasper shorter, more slender on apical portion, its dorsal tooth much larger, acute, nearly parallel with the ventral member, than which it is one-half shorter." (*Van Duzee*).

Known only from a single male taken July 29 at Kearney, Ontario. Not included in key, as no tangible characters of sufficient importance are given in description.

720 (—). *PHYTOCORIS BREVIFURCATUS* Knight, 1920, 53.

"Very similar to *eximius* but without the heavy oblique fuscous mark at apex of corium; second antennal darker fuscous on the middle third; head and pronotum distinctly grayish green on the paler parts;

posterior femora with smaller irrorations, not distinctly banded with pale; genital claspers and flagellum of male as in fig. 2. Length, 5.8 mm." (*Knight*).

Known only from Batavia, N. Y., where it was taken in July and August on the bark of trees in shaded situations.

721 (—). *PHYTOCORIS PENIPECTUS* Knight, 1920, 58.

Head, front half of pronotum, scutellum and basal half of corium brownish-yellow with fuscous markings; basal half of pronotum tinged with olive-green and with a narrow zigzag fuscous cross-bar in front of the yellowish hind margin; clavus and apical half of corium olive-green mottled with fuscous; tips of embolium and cuneus fuscous; membrane fuscous, the middle and a spot near tip of cuneus greenish-hyaline, veins yellowish; legs greenish-yellow with fuscous markings as in *eximius*. Antennæ with relative length of joints as in *eximius*; joint 2 fuscous-brown with a pale ring at base. Male genitalia as in fig. 12. Length, 5.1—5.3 mm.

New Canaan, Conn., Sept. 14 (*Walden*). Recorded only from that State and Massachusetts.

722 (—). *PHYTOCORIS PECTINATUS* Knight, 1920, 58.

"Very similar to *eximius*, colored more as in *penipectus* but more strongly invaded with green on the corium, clavus and scutellum; second antennal black except at base. Genital claspers and flagellum of male as in fig. 18. Length, 4.8 mm." (*Knight*).

Known only from Florida, where it has been taken at Gainesville, May 9, and Silver Springs, Sept. 25.

723 (—). *PHYTOCORIS SALICIS* Knight, 1920, 56.

Elongate, suboval. General color dull brownish-yellow, rather thickly clothed with appressed yellowish hairs, with scattered darker ones intermixed; head with numerous reddish markings, those on sides of front forming oblique transverse lines; pronotum dull yellow, apical third with reddish markings, extreme basal edge pale yellow, preceded by a transverse row of small vague fuscous spots; scutellum often with a narrow median pale stripe; elytra with scattered small vague fuscous markings; embolium indistinctly alternated with dull yellow and fuscous; cuneus with outer basal angle yellowish, apical half with fuscous or reddish markings; membrane pale fuscous marbled with whitish; legs straw-yellow, front and middle femora thickly flecked with reddish-brown, hind ones with fuscous-brown; tibiæ with three brown rings, the basal ones often broken into spots; under surface dull greenish-yellow, the sides of pleura and sometimes of abdomen dark brown. Joint 1 of antennæ pale yellow, thickly flecked with reddish-brown, the apical fifth brown, about three-fourths as long as basal width of pronotum; 2 and 3 pale brown, both narrowly yellowish at base, 2 darker at tip and near the pale base, twice as long as 1; 3 two-fifths as long as 2. Beak reaching third ventral. Male genitalia as in fig. 13. Length, 6.2 mm.

Marion Co., Ind., June 26—July 10; beaten from willow. Dunedin, Fla., April 10—20; frequent on foliage of willow and bay along the margins of ponds. Pigeon Cove and Oak Bluff, Mass., July 29—Aug. 3 (*Olsen*). Ranges from Ontario and New England west to the Dakotas and south to Florida. Occurs mainly on black willow, and probably predaceous.

724 (931). PHYTOCORIS ANGUSTULUS Reuter, 1909, 29.

Elongate, subparallel. Head reddish-yellow with a spot at base of loræ blackish, tylus yellow; beak reaching sixth ventral, yellowish, its apex fuscous; pronotum grayish-yellow with lateral and basal submargins fuscous, calli and collar paler, edge of hind margin pale; elytra fuscous-brown, corium with three translucent yellowish spots, the largest triangular on apex and united with the pale center of cuneus, apex and inner margin of cuneus fuscous; membrane fuscous with a pale spot near apex of cuneus and a smaller one behind it; first antennal pale yellow with fuscous spots, second and third fuscous each with a narrow pale ring at base, fourth blackish; femora blackish-brown thickly sprinkled with small yellow spots, hind ones with an oblique pale band near apex; tibiæ annulate with brown and yellow; coxæ pale yellow; ventrals blackish. Joint 1 of antennæ one-fourth longer than pronotum, 2 more than twice as long as 1, and nearly twice as long as 3, 4 one-third shorter than 3. Length, 6—6.2 mm.

Black Mountains, N. Car., July 18 (*Brimley*). Described from West Virginia and recorded from New York, Vermont and Nova Scotia. Collected by Knight on the hemlock, *Tsuga canadensis* (L).

725 (—). PHYTOCORIS OBTECTUS Knight, 1920, 58.

"Very similar to *eximius*, slightly smaller and more slender, hemelytra more uniformly grayish translucent, not distinctly marked with fuscous at apex of corium; front transversely striate with fuscous; scutellum grayish-brown, irrorate with paler; genital claspers and flagellum of male as in fig. 21. Length, 5.5 mm." (*Knight*).

Recorded only from Honeoye Falls, N. Y.

726 (—). PHYTOCORIS LACUNOSUS Knight, 1920, 56.

"Very similar to *cortitectus* only larger; nearly the size of *onustus* but more slender and paler in color; corium with a longitudinal pale area extending onto base of cuneus without interruption at cubitus; flagellum and right genital clasper of male as in fig. 4. Length, 6.7 mm." (*Knight*).

Described from McLean, N. Y., where it was taken on the bark of water beech, *Carpinus caroliniana* Walt., growing at the margin of a bog. Recorded elsewhere only from North Dakota where it was found by Hussey on willow.

727 (—). *PHYTOCORIS CORTITECTUS* Knight, 1920, 55.

"Very similar to *eximius*; pale parts of hemelytra more translucent, infuscations paler; front of head transversely striate with fuscous each side of median line; second antennal more uniformly fuscous but with a pale reflection throughout the infuscation; genital claspers and flagellum of male as in fig. 11. Length, 6 mm." (*Knight*).

Recorded only from Glen House, N. Hamp. and Batavia, N. Y., where it was found in late July in the crevices of the bark of elm.

GROUP IV.—PHYTOCORIS.

In this group the membrane is sometimes marbled but not flecked with pale spots, the antennæ are more pale than blackish with basal joint longer than width of head and the general color is usually yellowish to reddish over a paler background. It corresponds to Knight's Group IV and comprises twelve of our eastern species.

KEY TO EASTERN SPECIES OF GROUP IV, PHYTOCORIS.

- a. Disk of pronotum frequently in part or wholly red but without four distinct reddish stripes on a pale background.
- b. Pronotal disk with four to six black spots on basal submargin, these often vague or sometimes wanting; scutellum usually uniformly pale, rarely with a fuscous spot each side on apical half. 728. *QUERCICOLA*.
- bb. Pronotal disk without trace of black spots on basal submargin; scutellum usually with orange or red each side on apical half.
- c. Pronotum chiefly red, more red than pale or fuscous.
- d. Elytra with distinct yellowish dots or spots; calli darkened with fuscous. 729. *CONFLUENS*.
- dd. Elytra nearly a uniform deep orange-red without pale spots; calli wholly pale. 737. (male) *PUELLA*.
- cc. Pronotum with more pale or fuscous than red.
- e. Scutellum uniformly pale or bright yellow.
- f. Pronotum and elytra chiefly bright yellow, the former with an orange stripe projecting backward along outer margin of callus; scutellum bright yellow. 730. *LUTEOLUS*.
- ff. Pronotum and elytra pale brownish-yellow, the former without orange stripes; scutellum pale whitish yellow. 731. *ANGUSTIFRONS*.
- ee. Scutellum with an orange or reddish mark each side of median line.
- g. Disk of pronotum with basal and side margins dark fusco-reddish; scutellum yellow with a red mark each side on apical half but without a stripe at middle of base. 732. *INFUSCATUS*.

gg. Disk of pronotum chiefly pale, not darkened at base or on sides; base of scutellum with an orange colored stripe each side of median line, these frequently projected backward and uniting with an orange mark on each side of apical half.

733. OLSENI.

aa. Disk of pronotum with four orange or red stripes on a paler background.

h. Second antennal pale with a slender blackish line along its upper or front surface; embolium and outer half of corium green; clavus greenish to fuscous with a rather large irregular reddish blotch at middle and a smaller one on basal half.

734. TIBIALIS.

hh. Second antennal without a slender blackish line along its upper surface; embolium and outer half of corium marked with brown or reddish.

i. Apical half of corium with a large triangular yellow area just before cuneus; clavus, basal area of corium, embolium and cuneus bright red but flecked with paler spots.

735. VENUSTUS.

ii. Apical half of corium marked with reddish or if not, then its basal half without bright red.

j. Hind femora heavily marked with fuscous or red, the dark color inclosing small pale spots, the basal third pale; elytra dull yellow with dark red reticulations, more nearly fuscous-reddish on basal half of corium.

736. DEPICTUS.

jj. Hind femora chiefly pale marked with reddish only on apical half.

k. Dorsum pale, the elytra with orange or pale reddish reticulations; apical half of corium as distinctly marked as basal half; membrane pale, somewhat dusky at base.

l. Pronotum with a single transverse impression, the red stripes of disk not passing over calli to reach front margin.

737. (female) PUELLA.

ll. Pronotum with two transverse impressions, one behind and one in front of calli, the red stripes percurrent, passing over both of them onto collar.

738. RUBELLUS.

kk. Dorsum pale greenish-yellow, the elytra with fuscous reticulations; apical third of corium without dark marks; membrane pale fuscous, marbled with paler.

739. CARYÆ.

728 (—). PHYTOCORIS QUERCICOLA Knight, 1920, 60.

Elongate, subparallel. General color pale straw-yellow, more or less marked with reddish and fuscous, and thickly clothed with fine prostrate yellowish pubescence; head pale yellow with scattered red marks, front with conspicuous pale hairs; pronotum with collar and middle of apical third pale with a few red marks, remainder pale brownish-fuscous; elytra with numerous scattered reddish-brown reticulations, embolium and cuneus with red ones; membrane pale translucent, sometimes dusky marbled with paler; femora and first antennal pale yellow with numerous red or reddish-brown spots, remainder of antennæ pale brownish-yellow; tibiæ annulate with yellow and red, the hind ones less dis-

tinctly so; ventrals dull yellow with brownish or reddish spots on sides. Joint 1 of antennæ slightly longer than width of head, 2 more than twice as long as 1, 3 slightly more than one-half the length of 2, one-fourth longer than 4. Beak reaching sixth ventral. Male genitalia as in fig. 24. Length, 4.5—4.7 mm.

Ormond and Dunedin, Fla., Dec. 19—April 26 (*W. S. B.*). Long Island, N. Y., Aug. 17 (*Davis*). Taken at Dunedin in December from beneath boards on margin of pond; in spring by beating foliage of oak and bunches of Spanish moss hanging thereto. Recorded heretofore only from Massachusetts, New York and Maryland. Knight states that in the North it breeds on bur oak, *Quercus macrocarpa* Michx. The black spots on basal submargin of pronotum are formed by the interruption of the dark submarginal line as noted in *P. tuberculatus* Knight and other species of the genus, are variable in number and sometimes subobsolete. The membrane in northern specimens is often flecked with pale spots as plainly as in some of the species of Group I.

729 (951a). *PHYTOCORIS CONFLUENS* Reuter, 1909, 20.

Elongate-oblong. Head chiefly red, the tylus yellow; pronotum red, darker on calli and basal half, the middle of disk with some vague yellowish spots; scutellum red, basal angles and apex pale; elytra, including cuneus, dull red, distinctly mottled with yellow spots, corium often with a large pale spot at apex; membrane dusky with red veins; antennæ, front and middle legs and hind tibiæ pale yellow; hind femora red, paler at base usually rather thickly flecked with pale spots; ventrals yellow, more or less spotted with brown. Joint 1 of antennæ three-tenths longer than pronotum, 2 two and a half times longer than 1, 3 five-eighths the length of 2, one-third longer than 4. Beak reaching sixth ventral. Length, 4.6—5 mm.

Staten Island, N. Y., July 24 (*Davis*). Recorded from Connecticut and District of Columbia. Placed by Reuter as a variety of *puella* but apparently distinct.

730 (—). *PHYTOCORIS LUTEOLUS* Knight, 1923, 649.

Elongate, subparallel. Head yellow with orange to bright red markings on tylus, cheeks and loræ; pronotum, scutellum and elytra with color as in key and clothed with pale yellowish pubescence; calli and propleura whitish; basal third of corium and embolium and outer half of clavus with orange-red spots; apex of clavus and inner margins of cuneus with bright red spots; membrane pale fuscous, apical half with fuscous spots, veins yellowish; front and middle femora yellowish, paler at base, hind ones with apical half or more dark reddish flecked with yellowish spots; tibiæ pale, reddish near base. Antennæ yellowish, joint

1 one-fourth longer than width of head across eyes, 2 two and one-fourth times longer than 1, 3 nearly three-fifths the length of 2, about one-third longer than 4. Beak reaching fifth ventral. Length, 5—5.2 mm.

Described from Connecticut. Known also from Alabama.

731 (—). *PHYTOCORIS ANGUSTIFRONS* Knight Ms.

Elongate, subparallel. Pale dull yellow; elytra thickly marked with minute whitish tufts of short hairs; vertex, collar and calli whitish-yellow; basal half and sides of pronotum often with a brownish tinge; embolium, tip and inner margin of cuneus with small fuscous dots or spots; membrane pale hyaline, larger cell and two vague spots behind it fuscous, veins whitish; legs pale straw-yellow, apical half of femora pale fuscous, enclosing scattered white dots, hind femora with preapical pale ring; under surface dull yellow, a fuscous stripe along sides of ventrals. Joint 1 of antennæ pale yellow, flecked with brown, one-fifth longer than width of head across eyes; 2 dull yellow, three times as long as 1; 3 fuscous, narrowly paler at base, two-fifths the length of 2; 4 fuscous, as long as 3. Length, 4.5—5.2 mm.

Dunedin and Istokpoga, Fla., Feb. 22—April 20. Beaten in some numbers from bunches of Spanish moss where it was hibernating. Taken by Van Duzee, May 1, at Sevenoaks, Fla. Known only from that State.

732 (949). *PHYTOCORIS INFUSCATUS* Reuter, 1909, 20.

Elongate, subparallel. Head brownish-yellow flecked with red; pronotum with collar and middle of disk dull yellow tinged with reddish, sides and basal third fusco-reddish; elytra with clavus and inner half of corium dark reddish sparsely and vaguely mottled with small yellow spots; embolium and cuneus more distinctly reddish, the latter with base darker; corium with a paler spot on apex; membrane dusky, faintly marbled with pale blotches; antennæ yellowish, the outer joints with a dusky tinge; front and middle legs pale yellow, their femora tinged with reddish; hind femora except basal third, dark fusco-reddish, flecked with small yellow spots; tarsi fuscous. Joint 1 of antennæ one-fifth longer than pronotum, 2 two and three-fourth times longer than 1, 3 about one-half the length of 2, one-third longer than 4. Beak almost reaching base of genital. Length, 5.3—5.7 mm.

Marion Co., Ind., Sept. 25 (*W. S. B.*); one beaten from willow. Aqueduct, N. Y., July 27 (*Davis*). Ranges from Ontario and Massachusetts west to Michigan and southwest to North Carolina. Breeds on hickory and walnut.

733 (—). *PHYTOCORIS OLSENI* Knight, 1923, 647.

Elongate, subparallel. Head pale yellow; loræ, cheeks, middle of tylus median line and sides of base of vertex and oblique lines each side of front, orange-red; pronotum pale brownish-yellow, sides tinged with brownish, calli with a mark in front and a spot behind inner half of

each, orange; scutellum as in key; elytra pale brownish-yellow, middle of inner half of corium and outer half of clavus, dark brown; embolium pale flecked with reddish-orange, cuneus yellowish with vague reddish dots; membrane pale brown, veins darker; legs straw-yellow, hind femora dark brown, apical half reddish with pale spots; front and middle tibiæ each with two reddish-brown rings, those on middle pair often vague, hind tibiæ reddish near base; tarsi yellowish, dusky at tip; ventrals straw-yellow, orange-red on sides. Joint 1 of antennæ pale yellowish, tip and two spots on front face brown, one-sixth longer than width of head across eyes; 2 and 3 yellowish brown, 2 twice as long as 1. Beak reaching seventh ventral. Upper surface clothed with suberect dusky hairs intermixed with silky yellow pubescence. Length, 5.8—6.2 mm.

Known only from New York and New Jersey.

734 (952). *PHYTOCORIS TIBIALIS* Reuter, 1876, 68.

Elongate, subparallel. Pale straw-yellow, sparsely and finely pubescent; some irregular markings on face and a transverse line across vertex between base of eyes, orange-red; disk of pronotum with four short broad orange-red stripes, these not reaching base and in front interrupted by the calli but present, though narrower, on collar; clavus fuscous-brown, its base, a spot near middle and the inner half of corium paler and flecked with reddish; cuneus and membrane pale translucent yellow, their veins reddish; apical halves of front and middle femora and first joint of antennæ annulate with red and yellow; front and middle tibiæ also annulate and with a reddish-fuscous line along their upper surface; ventrals a uniform pale yellow. Joint 1 of antennæ as long as pronotum, 2 more than twice as long as 1, 3 one-third the length of 2, slightly longer than 4. Length, 5—5.3 mm.

Knox Co., Ind., Sept. 23; swept from herbage along the margins of the Wabash River. Ranges from Ontario and New England west to Wisconsin and Iowa and southwest to Texas and Nicaragua. Readily known by the pale color, red markings and dark lines on second antennal and front and middle tibiæ.

735 (—). *PHYTOCORIS VENUSTUS* Knight, 1923, 651.

Elongate-oval. Head orange-red; spot each side of vertex and one on base, two spots on median line of front and one on base of tylus, pale yellow, middle of tylus red; pronotum pale with stripes as in *aa* of key, collar and small spot before each callus orange-red; scutellum red, basal angles and median line paler; elytra as in *i* of key; membrane pale fuscous, veins brown; legs straw-yellow, femora flecked apically with red; hind tibiæ with reddish spots near base; ventrals yellowish, vaguely spotted with red. Antennæ yellowish, joint 1 darker at apex, one-sixth longer than width of head across eyes, 2 nearly twice as long as 1, 3 one and two-third times as long as 2, 4 one-sixth shorter than 3. Beak reaching sixth ventral. Pronotum, scutellum and clavus clothed with rather prominent inclined yellowish hairs. Length, 4.5—4.9 mm.

East River, Conn., July—August (*Walden*). Recorded only from that State, New York and District of Columbia.

736 (—). *PHYTOCORIS DEPICTUS* Knight, 1923, 654.

Elongate, subparallel. Head yellow marked with orange-red; pronotum pale brownish-yellow tinged with dusky, calli pale, disk behind them with four orange stripes; scutellum yellowish with an oblique orange stripe each side; elytra as in key; extreme tip of clavus and a small spot near inner basal angle of cuneus, black, beset with prominent black hairs; membrane pale fuscous, cells and central area with hyaline spots, veins pale fuscous; hind femora as in key; spines on hind tibiæ pale with reddish spots at base; ventrals pale yellow, sides dotted with red. Antennæ yellowish, joint 1 with a few reddish dots, tapering from base to near apex, slightly longer than width of head across eyes; 2 two and two-fifth times longer than 1, 3 and 4 subequal, united almost twice as long as 2. Beak reaching fifth ventral. Upper surface rather thickly clothed with prostrate yellow pubescence. Length, 4.1—5.3 mm.

St. Anthony Park, Minn., Aug. 11 (*Minn. Univ. Coll.*). Known only from Batavia, N. Y., and Minnesota. Occurs on ash and bur oak.

737 (951). *PHYTOCORIS PUELLA* Reuter, 1876, 69.

Male—Elongate, slender, subparallel. General color above dark red with yellow markings; vertex reddish-yellow, front dark orange-red; pronotum with collar and four narrow entire stripes behind calli orange-red, calli and basal angles yellow; scutellum yellow with an oblique reddish spot each side of middle; clavus, except base, and inner half of corium, fuscous-red, corium elsewhere paler; cuneus dark red flecked with yellow; membrane fuscous, the veins red; legs pale yellow, apical half of femora and base of tibiæ with orange-red markings; under surface in great part pale, the sixth ventral and genital fuscous. Joint 1 of antennæ pale yellow with reddish markings, one and two-third times the length of pronotum; 2—4 pale yellow, 2 two and one-fifth times longer than 1, 3 one-fifth longer than 4, the latter subequal in length to 1. Eyes very large, their diameter greater than interocular width. *Female*—Usually pale greenish-yellow; orange stripes on pronotum often interrupted; scutellum pale yellow; elytra everywhere reticulate with orange-red; ventrals, tarsi and apical halves of tibiæ often in great part fuscous. Length, 4.5—5.2 mm.

Lake, Knox and Posey counties, Ind., Aug. 14—Sept. 22. Beverly Hills, Ill., Aug. 31, at light (*Gerhard*). Yaphank, Long Island, N. Y. (*Davis*). Swannanoa, N. Car., July (*Brimley*). My Indiana specimens were swept from weeds along the margins of orchards and roadsides. Its known range extends from Quebec and New England west to Illinois and Kansas and southwest to North Carolina. Van Duzee (1917, 318) includes Florida but there is no definite station record from that State.

738 (—). PHYTOCORIS RUBELLUS Knight Ms.

Close to *puella*. Head and pronotum pale yellow, the former with vague reddish markings, the latter with four rather broad percurrent red stripes; scutellum red with basal angles and tip yellow; elytra dull red, thickly clothed with prostrate whitish hairs, embolium with small yellow spots; cuneus red, inner basal angle darker; membrane dusky hyaline, veins red; femora dull red, paler at base, hind ones with fuscous bars enclosing yellow dots; tibiæ reddish-yellow, tarsi darker. Joint 1 of antennæ shorter and stouter than in *puella*, dark red with yellow spots; 2 reddish-yellow, two and one-half times as long as 1; 3 and 4 fuscous, united equal to 2. Length, 4.8–5.2 mm.

Laporte Co., Ind., Aug. 26. Ranges from Indiana west to Iowa and Kansas.

739 (—). PHYTOCORIS CARYÆ Knight, 1923, 652.

Elongate, sides subparallel. Head yellow with prominent pale hairs and with orange spots on sides of front, behind eyes and on loræ; pronotum greenish-yellow, the four orange stripes often confluent behind, calli pale, collar with orange spot each side of middle; scutellum greenish-yellow, an oblique orange spot each side of middle; elytra as in key; legs yellowish, apical halves of femora flecked with brown or red spots; ventrals pale greenish-yellow. Antennæ yellow, joint 1 with small orange spots, one-fourth longer than width of head across eyes; 2 slightly more than twice as long as 1; 3 three-fifths the length of 2, one-third longer than 4. Beak reaching upon fifth ventral. Length, 5.3 mm.

Batavia, N. Y., July 29 (*Walden*). Recorded only from there; occurs on hickory.

V. STENOTUS Jakovlef, 1877, 288.

Elongate, suboval, almost glabrous shining species of medium size having the head porrect, not exserted, its front subvertical, vertex without an impressed line; eyes large, oval, their long diameter slightly greater than width of vertex; beak reaching third ventral; pronotum subtrapezoidal, its side margins rounded, hind portion convex, finely rugose; scutellum largely exposed, slightly convex; elytra entire, surpassing the abdomen; hind femora reaching genital plate; joint 1 of hind tarsi twice as long as 2. One species is known.

740 (969). STENOTUS BINOTATUS (Fabricius), 1794, 172.

Greenish-yellow. Male with tylus and two broad divergent stripes on pronotum black, the stripes extending from calli back to cover basal two-thirds of clavus and inner portion of apical half or more of corium; scutellum yellow the side margins of base black; cuneus yellow; membrane fuscous with paler veins; genital segment and a row of spots along outer margins of ventrals blackish; tarsi fuscous. Pronotum of

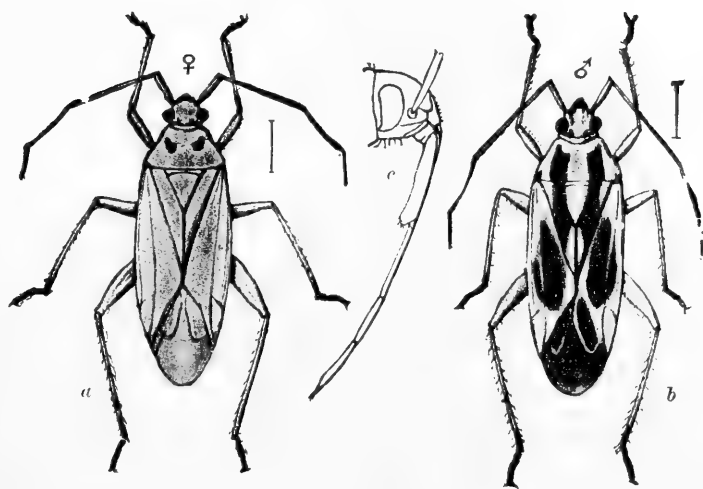


Fig. 169. *a*, female; *b*, male, X 6; *c*, head from side. (After Howard, *Insect Life*).

female with two ill-defined rounded dark spots behind the calli, the stripes on elytra narrow, interrupted, limited to the claval suture and inner apical fourth of corium; membrane and under surface wholly greenish-yellow. Antennæ about as long as body, joint 1 as long as head, 2 two and a half times longer than 1, 3 one-half the length of 2, nearly twice as long as 4. Length, 6.2—7 mm. (Fig. 169).

Marion and Putnam counties, Ind., June 1—July 4; common along the borders of wet meadows and fields of oats and wheat. Delaware Co., Pa., June (*Gerhard*). Swannanoa, N. Car., (*Brimley*). A palæarctic European species, known as the "timothy-grass bug," and ranging in this country from Quebec and New England west to Minnesota and the Pacific. Not before recorded south of Maryland. From the records it seems to reach maturity about May 15 and almost wholly disappears by the middle of July. Howard (1892, 90) mentions it as injurious to timothy in Green Co., N. Y., the insect in all stages being found in numbers upon the heads in early July. Knight states that it "breeds on orchard grass, *Dactylus glomerata* L., and probably to some extent on other grasses."

VI. CREONTIADES Distant, 1883, 237.

Elongate, finely pubescent, shining species having the head porrect, its front declivent, vertex with a median impressed line; eyes large, oval, coarsely granulated; beak reaching or

surpassing hind coxæ; pronotum trapezoidal, its width at base about twice that of apex, sides rounded, basal portion convex, finely rugose; scutellum subrectiform, minutely transversely rugose; elytra entire, surpassing abdomen; hind femora reaching tip of abdomen; tibiæ with long and prominent setæ. Five species are recorded by Van Duzee (1917) from North America, three from our territory.

KEY TO EASTERN SPECIES OF CREONTIADES.

- a. Color greenish- or straw-yellow, more or less tinged with reddish; apex of corium without brown dots.
- b. Front of vertex subdepressed; calli scarcely evident; upper surface and legs more or less tinged with reddish.

741. RUBRINERVIS.

- bb. Front of vertex rather strongly convex; calli distant, rather prominent; upper surface and legs not tinged with reddish.

742. DEBILIS.

- aa. Color in great part piceous; apex of corium with three brown dots.

743. FILICORNIS.

741 (960). CREONTIADES RUBRINERVIS (Stal), 1862, 321.

Elongate, slender, subparallel. Greenish-yellow fading to straw-yellow, usually more or less tinged with rosaceous; pronotum with sub-basal margin blackish, the edge behind it whitish; scutellum of female often in great part fuscous; elytra with the inner marginal veins of clavus and commissure and the veins of membrane rosaceous; sometimes the entire elytra, including cuneus, strongly tinged with the same hue; membrane pale fuscous-hyaline, veins reddish; antennæ greenish-yellow, joints 1 and 2 often reddish, the apical third of joints 2 and 3 darker; legs straw-yellow tinged with reddish, the tibiæ of males and sometimes of females in great part green; tarsi in part and tarsal claws fuscous. Joint 1 of antennæ stout, cylindrical, finely and sparsely setose, as long as pronotum, 2 about twice the length of 1, 3 one-fifth shorter than 2, more than twice the length of 4. Width of apex of pronotum about two-thirds the median length of disk. Length, 6.5—8 mm.

Sanford, Sarasota and Dunedin, Fla., Nov. 17—April 4. Occurs throughout the greater part of that State but not taken by me or recorded from the extreme southern portion. About Dunedin it is common in late autumn and spring, both on Hog Island and the mainland, on low huckleberry and other shrubs and grasses in the open pine woods and along the margins and pathways of hammocks. Described from Mexico and recorded in this country only from Florida and California.

742 (964). CREONTIADES DEBILIS Van Duzee, 1915, 111.

Smaller and more slender than *rubrinervis*. Color a nearly uniform pale straw-yellow; tibiæ translucent green; extreme tips of scutellum

and beak and tarsal claws fuscous. Pronotum shorter, broader, much less narrowed in front than in *rubrinervis*, its apex subequal in width to median length; calli distinct, their front halves connected. Beak reaching onto first ventral. Length, 6 mm.

Tybee Island, Ga., July 26 (*Van D.*). This is the type locality and it is recorded only from there and Estero, Fla.

743 (961). CREONTIADES FILICORNIS (Walker), 1873, 96.

"*Female*—Piceous, fusiform, finely punctured, tawny beneath. Head triangular. Eyes slightly prominent. Rostrum tawny, extending a little beyond hind coxæ. Antennæ tawny, filiform, as long as body; first joint much longer than head; second more than twice the length of first; third a little longer than first, fourth much shorter than third. Prothorax with a strongly marked transverse furrow. Legs tawny, slender. Corium tawny; tip with a red spot and with three brown dots. Membrane brownish. Length of body 4 lines. St. John's Bluff, East Florida. Presented by E. Doubleday, Esq."

The above is the original description of the *Capsus filicornis* of Walker. Distant (1904, 106) placed it in the genus *Creontiades*, though in color it is apparently widely different from our other species.

VII. POLYMERUS Hahn I, 1831, 27 (*Pæciloscytus* Fieb.).

Oblong or elongate-oval pubescent species having the head short, distinctly wider across the eyes than long, the front subvertical; base of tylus viewed from above, distinctly below (in front of) the insertion of antennæ; beak usually reaching to or beyond middle coxæ; antennæ shorter than body, variable as to species, the last two joints much more slender than the others; pronotum trapezoidal, about twice as wide at base as long, without median constriction, calli evident but feeble, hind portion convex, declivent forward, more or less rugose; scutellum triangular, equilateral, convex; elytra entire, surpassing abdomen, male, or reaching only its tip, female, cuneus and membrane strongly deflected. About 30 species are known from the United States, 15 of which occur in our territory. They were formerly classed under the generic name *Pæciloscytus* Fieber.

KEY TO EASTERN SPECIES OF POLYMERUS.

- a. Beak reaching upon or surpassing hind coxæ.
- b. Larger, length usually 4.3 or more mm.
- c. Cuneus wholly or in great part red, rarely paler; beak reaching onto first ventral; general color greenish-yellow varied with blackish; apical half of femora annulate with brown.

744. BASALIS.

cc. Cuneus not red; beak not passing hind coxæ.

d. Upper surface black and pale; apical half of femora reddish-yellow; cuneus and scutellum, except basal angles, pale; tibiæ pale. 745. *NIGROPALLIDUS*.

dd. Upper surface uniformly black, the tips of embolium and cuneus alone pale; apical half of femora reddish-brown with a pale subapical ring; tibiæ yellowish stained with reddish.

746. *TINCTIPES*.

bb. Smaller. Length, less than 4 mm.

e. Pronotum fuscous-black, the collar, edges of side margins, area in front of and each side of calli, and a backward projecting ray between them dull yellow; hind femora with brown spots; length 3.5—3.8 mm. 747. *CUNEATUS*.

ee. Color of pronotum not as above; beak reaching sixth ventral; femora without spots or rings; length, 3.2 mm.

748. *DELONGI*.

aa. Beak not reaching upon hind coxæ.

f. Beak reaching upon middle coxæ.

g. Upper surface black, the narrow apex of cuneus and a line each side of fracture, paler; tibiæ uniformly black.

749. *PROXIMUS*.

gg. Upper surface black and pale; cuneus with at least the inner half red, tip of scutellum and basal third of corium pale; tibiæ pale. 750. *UNIFASCIATUS*.

ff. Beak not reaching middle coxæ.

h. Tibiæ in part or wholly pale; upper surface in great part black.

i. Elytra wholly black clothed with silvery silken pubescence; legs tinged with fuscous. 751. *NUBILIPES*.

ii. Elytra in part pale.

j. Legs almost wholly pale.

k. Cuneus black, its narrow carinate edge and that of embolium wholly pale; apical half of hind femora with several fuscous dots near middle of outer face.

752. *PUNCTIPES*.

kk. Cuneus and embolium pale or reddish-yellow; legs wholly reddish-yellow, the apical half of hind femora with not more than one fuscous dot. 753. *FULVIPES*.

jj. Legs in part black; femora red, the apical third black; tibiæ orange-red at middle, the base and tip black.

754. *VENUSTUS*.

hh. Tibiæ wholly black.

l. Femora red with only the tips black; beak reaching onto front coxæ.

m. Larger, length 6.4 mm.; embolium and cuneus wholly black.

755. *GERHARDI*.

mm. Smaller, length 4.5—5 mm.; embolium and outer edge of cuneus yellowish. 756. *BREVIROSTRIS*.

ll. Femora not red; beak reaching behind front coxæ; length, not more than 6 mm.

- n.* Cuneus red; second antennal distinctly more slender than basal one; upper surface black, somewhat shining, clothed with silvery silken pubescence. 757. VENATICUS.
- nn.* Cuneus black; second antennal equal to first in thickness; upper surface deep black, opaque, scutellum and elytra clothed chiefly with black pubescence. 758. OPACUS.

744 (991). POLYMERUS BASALIS (Reuter), 1876, 73.

Elongate-oval, sparsely clothed with yellow or silvery appressed pubescence. General color dull greenish-yellow with variable fuscous or black markings; vertex transversely striate with oblique parallel black lines each side of middle, tylus black, shining; disk of pronotum with a line across the subapical constriction, a small round spot on each callus and two spots, varying much in shape and size, just behind the calli, blackish, these sometimes merging so that the disk is in great part blackish; scutellum pale greenish-yellow, its base and side margins from base to middle usually blackish; elytra with clavus and inner apical half of corium fuscous-black, cuneus in part or wholly reddish; membrane translucent fuscous or dusky, its veins paler; first antennal shining black with both extreme base and apex whitish; second reddish-brown with a black ring at base, its apical fourth and third and fourth antennals fuscous; under surface and legs greenish-yellow, the apical third of femora annulate with reddish-brown, tibial spines black; middle of ventrals 1—3 usually blackish in female. Length, 4.5—5.5 mm.

Frequent throughout Indiana, June 5—Oct. 6. Dunedin, Moore Haven and Canal Point, Fla., Nov. 16—April 10 (*W. S. B.*). Agricultural College, Miss. (*Wcd*). Occurs in Indiana on foliage and flowers along roadsides and on weeds, especially ragweed and dog-fennel, in meadows. Found throughout Florida, where it is frequent in spring on tall grasses along margins of ponds. It is our most common and most widely distributed species of the genus, ranging from Quebec and New England west to South Dakota and Colorado, and southwest to Florida, Texas and New Mexico. Varies exceedingly in color and also in the amount of pubescence, the majority of cabinet specimens being almost glabrous. Those taken in autumn are usually darker than the ones of early summer, some having the entire upper surface, except cuneus, base of corium and tip of scutellum, fuscous-black. On these Knight has based his var. *fuscatus*^{80a}. For a pale form found in the southern states, in which the beak is generally shorter and the eyes of male somewhat larger than those of the north, Knight^{80a} has restored the name *sericeus* Uhler (1877, 422), usually regarded as a synonym of *basalis*. Of this Uhler wrote: "In Maryland it may be met with from the first of June to the end

^{80a} There has appeared since these pages were in type a paper by Knight (Can. Ent. July, 1926) in which these names were used. In it he also records *P. flavo-cuneatus* Reut. (1907b, 8), a Jamaican species, from Sanford and Biscayne Bay, Fla.

of October, and it lives upon violets, weeds and herbs in low grounds."

745 (—). *POLYMERUS NIGROPALLIDUS* Knight, 1923, 599.

Head black, with median line, loræ and spot next to eye on vertex, dull yellow; pronotum black, the collar, front margins of calli, line between them, dot on disk and basal margin, yellowish; scutellum dull yellow, the basal angles and mesoscutum blackish; elytra dull yellow, clavus with inner half and corium with outer margin and stripe on outer portion of apical half blackish; membrane dark fuscous, veins paler; legs tawny-yellow, spines of tibiæ and last tarsal segment blackish; ventrals yellow with paler pubescence. Antennæ black, joint 1 two-fifths as long as width of head across eyes; 2 four times the length of 1, two and one-fifth times as long as 3. Length, 4.3—4.5 mm.

Described from Brown's Mills Junction, N. J., and known only from there.

746 (—). *POLYMERUS TINCTIPES* Knight, 1923, 600.

Color as in key, clothed above with silken white pubescence; membrane fuscous-brown; narrow apex of cuneus and embolium pale; femora with basal halves yellowish, their lower face with numerous erect hairs, each hair with a fuscous dot at base; ventrals black with paler pubescence. Antennæ black, brownish apically, joint 1 three-fourths as long as width of vertex, 2 as long as width of pronotum at base; 3 one-half the length of 2, one-third longer than 4. Beak reaching hind margins of hind coxæ. Length, 3.7—4.2 mm.

Recorded only from Great Falls, Md., where it was collected on a lichen covered rock.

747 (—). *POLYMERUS CUNEATUS* (Distant), 1893, 435.

General color above fuscous-black, head with tylus shining black, cheeks, loræ, a spot on middle of vertex and another near each eye, dull yellow; color of pronotum as in key; tip of scutellum yellowish; outer half of clavus and basal fourth of corium usually more or less dull yellow; embolium, anal ridge, outer apical angle of corium and tip of cuneus also yellowish; membrane a uniform translucent fuscous, feebly iridescent, veins yellow; legs dull greenish-yellow, hind femora with two rows of small vague brownish dots on outer face and usually a brownish ring near apex, sometimes in great part fuscous-brown, tips of tarsi and beak fuscous; under surface dull yellow, the pleura and side margins of ventrals more or less fuscous. Joint 1 of antennæ yellow, fuscous near base and apex, three-fourths as long as basal width of vertex; 2 yellow, the apical fourth black, three and a half times longer than 1; 3 fuscous, yellow at base, one-third longer than 4, the two united two-thirds the length of 2. Disk of pronotum very finely rugose, with minute punctures between the rugæ. Scutellum finely transversely rugose. Clavus and corium very finely punctate. Beak reaching hind coxæ. Length, 3.5—3.8 mm.

R. P. Park, Canal Point and Ft. Myers, Fla., March 4—April 8; swept in some numbers from low herbage growing in moist mucky places. Recorded also from Biscayne Bay, Fla., and Texas. Described from Mexico and Central America. Uhler (1894a, 193) says of it in Grenada: "It is a common species in the Antilles and on the borders of the adjoining continent. Many specimens were collected at light and others swept from herbage in August." The *P. claudestinus* Blatch. (1926, 164) is a synonym.

748 (—). *POLYMERUS DELONGI* Knight, 1925, 252.

Pale reddish-brown clothed with fine yellow appressed hairs intermixed with paler suberect ones; vertex yellowish, tylus fuscous; pronotum tinged with reddish, front angles each with a round blackish spot; lower margins of propleura pale; mesoscutum fuscous, narrowly exposed; apex of scutellum pale; elytra yellowish tinged with reddish, inner half of clavus pale fuscous, cuneus yellow, the inner half reddish; membrane fuscous, the veins and margins near apex of cuneus pale; coxæ and front and middle femora yellowish tinged with reddish; hind femora dark red, paler at base and apex; tibiæ and tarsi yellowish; ventrals reddish-yellow, genital region darker. Joint 1 of antennæ yellowish, as long as width of vertex; 2 yellow at base, fuscous toward apex, four times as long as 1; 3 dusky yellow, two-thirds the length of 2. Length, 3.2 mm.

Known only from Paradise Key, R. P. Park, Fla.

749 (—). *POLYMERUS PROXIMUS* Knight, 1923, 601.

Color a nearly uniform black, clothed above with yellowish and black pubescence intermixed; scutellum narrowly pale each side of apex; membrane and veins dark fuscous; legs and ventrals wholly black, the latter with pale pubescence. Antennæ black, brownish apically, joint 1 as long as or slightly longer than width of vertex, 2 as long as width of pronotum at base, 3 two-fifths as long as 2. Beak barely reaching hind margins of middle coxæ. Length, 5.3 mm.

Recorded from Pennsylvania, Minnesota and Missouri.

750 (988). *POLYMERUS UNIFASCIATUS* (Fabricius), 1794, 178.

Male—Elongate, subparallel. Black with yellow markings, clothed with fine depressed, golden yellow hairs and a few blackish suberect ones; head yellow, vertex and tip of tylus shining brown; pronotum black, its collar, narrow side margins, median dash and edge of hind margin, yellow; apex of scutellum, basal third and apex of corium, apical half or more of embolium, anal ridge, apical third or more of front and middle femora and all the tibiæ, yellowish; hind femora either fuscous-black with basal half and two subapical bands dull yellow or wholly pale yellow; membrane fuscous, the veins and central area paler. Antennæ with joint 1 and basal third of 2 yellowish, remainder brown to blackish; 1 as long as width of vertex, 2 two and a half times as long as 1. Prono-

tum coarsely transversely wrinkled, scutellum more finely so; calli smooth, united at middle, each with a distinct concavity. Elytra surpassing abdomen by more than half the length of membrane. *Female*.—More robust, suboval, widest across base of cuneus. Dull brownish-yellow with dark markings vague, sometimes only the clavus and apical half of corium tinged with brownish. Joint 2 of antennæ more slender and one-third longer than in male. Beak reaching behind middle coxæ. Elytra sometimes abbreviated and reaching only tip of abdomen. Length, 5.4—6.2 mm.

Champaign, Ill., June 14, at light; New Mexico (*Ill. Nat. Hist. Surv. Coll.*). A palæarctic European species ranging in this country from Quebec and New England west to Colorado, North Dakota and British Columbia, and in the southwest known from Utah and New Mexico. Breeds on the bedstraw, *Galium boreali* L.

751 (—). *POLYMERUS NUBILIPES* Knight, 1925, 248.

Black, feebly shining; above clothed with silvery-gray to yellowish-brown pubescence, intermixed with scattered suberect fuscous hairs; legs orange-yellow, apical half of femora and basal half of tibiæ heavily tinged with fuscous, the former with an incomplete subapical pale ring; tips of tibiæ and last tarsal joint, blackish. Antennæ black, brownish apically, joint 1 as long as width of vertex, 2 equal in length to width of base of pronotum, two and one-fourth times longer than 3; 4 one-eighth longer than 3. Beak reaching middle of sternum. Length, 4.7 mm.

Recorded only from Greenwood, Wis., and Minnesota.

752 (—). *POLYMERUS PUNCTIPES* Knight, 1923, 602.

Oblong-oval. Black, scabrous, subopaque, sparsely clothed with fine silky prostrate silvery gray pubescence; head with a small round yellow spot each side of vertex; narrow outer edge of embolium and cuneus pale yellow; membrane fuscous, its veins pale. Joint 1 of antennæ half the length of pronotum, black with base yellow; 2 fuscous, nearly as thick as and three and three-fifth times the length of 1; 3 yellowish tinged with dusky, one-third the length of 2; 4 fuscous, one-fifth longer than 3. Length, 4.6—5.4 mm.

Starke and Marshall counties, Ind., June 11—18. Swept in some numbers from herbage along the borders of lakes. Swananoa, N. Car., June 23 (*Brimley*). Ranges from Quebec and New England west to Minnesota and south to Jacksonville, Fla. Knight swept it "from scattering plants of whorled loosestrife, *Lysimachia quadrifolia* L., which were growing along an old clay roadway."

753 (—). *POLYMERUS FULVIPES* Knight, 1923, 603.

Elongate, suboval. Black, feebly shining, clothed with silken yellow pubescence; embolium, cuneus and legs as in key; membrane dark fus-

cous, a narrow pale spot bordering tip of cuneus, veins yellowish; tarsi and tips of tibiæ fuscous; ventrals black. Joint 1 of antennæ yellowish, with apex and pubescence black, slightly longer than width of vertex; 2 black, cylindrical, slightly narrowed at base, as thick as and three and one-half times longer than 1; 3 fuscous, nearly one-third the length of 2; 4 blackish, one-fourth longer than 3. Beak reaching middle of sternum. Pronotum and scutellum minutely transversely rugose. Elytra finely scabrous. Length, 4.5—5.1 mm.

Ashland, Mass., June 27 (*Frost*). Danielson and New Haven, Conn., June 14—21 (*Walden*). The recorded range extends from New England west to South Dakota and south to North Carolina.

754 (—). *POLYMERUS VENUSTUS* Knight, 1923, 605.

Black, opaque, minutely and sparsely pubescent, lower margin of cheeks and basal joints of beak, red; membrane dark fuscous, its veins paler; coxæ, basal two-thirds of femora and middle of tibiæ orange-red; tarsi yellow, their tips and claws fuscous. Antennæ with joint 1 stout, black, four-fifths as long as greatest width of head; 2 reddish-fuscous, more slender, two and a half times the length of 1; 3 dull yellow, one-half the length of 2; 4 fuscous, subequal in length to 3. Pronotum minutely granulate, transversely finely strigose. Scutellum and elytra scabrous. Length, 5.2—5.8 mm.

Dunedin, Fla., March 14—29; swept in some numbers from the flowers of American germander, *Tecurium canadensis* L., and lizard's tail, *Saururus cernuus* L., growing in low moist ground. Wenona, N. Car., May 25 (*Brimley*). Recorded by Knight from Michigan, Virginia and North Carolina. Hussey reports it as: "Abundant, in Berrien Co., Mich., June to September, in beds of *Saururus cernuus* growing in shady glens and marshes."

755 (—). *POLYMERUS GERHARDI* Knight, 1923, 606.

Black, opaque, thickly clothed with prostrate silky white pubescence; vertex with a yellowish spot each side; membrane and veins a uniform dark brownish-black; antennæ black, the apical joints reddish to fuscous; coxæ and femora deep orange-red; tibiæ, tarsi and tips of femora black. Joint 1 of antennæ half the length of pronotum, 2 three and one-fifth times the length of 1, 3 slightly less than half the length of 2, a little longer than 4. Pronotum and elytra finely, irregularly rugulose, the latter with suberect simple black hairs intermixed with the pubescence. Length, 6.4 mm.

Hessville, Lake Co., Ind., July 1, type locality (*Gerhard*); collected at light. Recorded only from there and Cotulla, Tex.

756 (—). *POLYMERUS BREVIROSTRIS* Knight, 1925, 246.

Black, clothed with yellow silky pubescence intermixed with pale and fuscous suberect hairs; narrow basal margin of pronotum, embolium and

usually the narrow outer edge of cuneus dull yellow; membrane black, veins yellowish; legs orange to red, tibiæ, tarsi and tips of femora black, hind femora with a vague subapical fuscous band. Joints 1 and 2 of antennæ black, 1 as long as width of vertex, female, slightly longer, male; 2, three and four-fifth times the length of 1; 3 orange-yellow, fuscous apically, two-fifths as long as 2; 4 fuscous, paler at base, one-third longer than 3, male, one-eighth longer than 3, female. Beak scarcely reaching hind margins of front coxæ. Length, 4.5—5 mm.

The recorded range extends from Wisconsin and Manitoba west to the Dakotas.

757 (995). *POLYMERUS VENATICUS* (Uhler), 1872a, 471.

Elongate-oblong. Black, finely granulose, rather thickly clothed with very fine prostrate silky silvery-gray pubescence; vertex with a small yellow spot near each eye; cuneus and extreme tip of embolium reddish-yellow; membrane fuscous-brown, its veins yellowish; legs in great part black, in female the coxæ, basal half of hind and middle femora, front femora except the upper face of apical half and joints 1 and 2 of tarsi, yellow; coxæ usually black in male. Antennæ with joints 1 and 2 black, 3 and 4 dull yellow; 1 as long as head, 2 three times as long as 1, 3 and 4 subequal, together two-thirds the length of 2. Length, 5—6 mm.

Starke, Marshall, Marion and Putnam counties, Ind., June 9—18; probably occurs throughout the State; swept from herbage along the margins of marshes and lakes. Swannanoa, N. Car., June 22 (*Brimley*). The coxæ of male are sometimes yellow as in female, not always black as stated by Knight, and in one specimen at hand the narrow edge of embolium is wholly pale as in *punctipes*. The general distribution is northern, extending from Quebec and New England to the Pacific, but it is also recorded by Van Duzee (1909, 178) from Sanford, Fla., under the name *Polymerus americana* Reut., which he regards as a synonym. Under this name it is also recorded from Texas and New Mexico by Uhler (1904, 357), who says: "The range of this species is now seen to be from the uplands of Texas and New Mexico, northwest into British Columbia and from thence eastwardly to the Province of Quebec and Northern Maine." Many of the early records should doubtless be referred to *P. punctipes* Knight.

758 (—). *POLYMERUS OPACUS* Knight, 1923, 604.

Black, opaque, clothed with silvery and blackish silky pubescence; membrane brownish-black, veins yellowish to dusky; legs black, coxæ, basal third of femora and two basal joints of tarsi, yellowish. Joints 1 and 2 of antennæ black, 1 slightly longer than width of vertex; 2 three

and one-half times the length of 1; 3 and 4 dusky yellow, subequal, each nearly two-fifths as long as 2. Beak reaching middle of sternum. Length, 4.3—4.8 mm.

Tompkins Co., N. Y., July 3 (*Walden*). Recorded only from Ontario, New England and New York. Breeds on the flat-topped white aster, *Dællingeria umbellata* (Mill.).

VIII. DICHROOSCYTUS Fieber, 1858, 309.

Oblong or elongate, subparallel species having the head short, twice as broad across the eyes as long, its front declivent, vertex margined at base between the eyes, without median sulcus; antennæ shorter than body, joint 1 stout, cylindrical, not surpassing tip of tylus, 2 more slender, not swollen toward apex, more than three times as long as 1, 3 and 4 still more slender, united distinctly shorter than 2, 4 about three-fourths the length of 3; beak reaching or passing second ventral; pronotum short, trapezoidal, twice as wide at base as long, collar and calli distinct; disk behind the calli convex, finely rugose with minute punctures between the rugæ, its hind margin broadly rounded; scutellum triangular, equilateral, higher than clavus; mesoscutum concealed; elytra entire, longer than abdomen, clavus convex, deflected to corium, cuneus and membrane strongly deflected; tarsi with joints 1 and 2 subequal, 3 almost as long as the others united. Seven species have been described from North America, four from our territory. They occur for the most part on cedar and pine.

KEY TO EASTERN SPECIES OF DICHROOSCYTUS.

- a.* Larger, length 4.5 or more mm.; base of scutellum, elytra, except embolium and inner angles of cuneus, usually deep reddish. 759. SUSPECTUS.
- aa.* Smaller, not over 3.5 mm.; elytra greenish or greenish-yellow, at the most only tinged with reddish.
- b.* Eyes of moderate size, their long diameter not greater than width of interocular area; elytra without a distinct fuscous cross-bar on apical third of corium.
- c.* Membrane pale green; pubescence of pronotum very fine, scarcely visible; elytra greenish tinged with reddish. 760. ELEGANS.
- cc.* Membrane fuscous; pubescence on pronotum blackish, more conspicuous; elytra bright green or greenish-yellow. 761. VIRIDICANS.
- bb.* Eyes very large, their long diameter distinctly greater than width of interocular area; elytra with a distinct fuscous cross-bar on apical third of corium. 762. MACULATUS.

759 (996). *DICHRROSCYTUS SUSPECTUS* Reuter, 1909, 37.

Greenish-yellow; elytra usually heavily tinged with reddish, but often fading to greenish-yellow with a faint roseate tinge; embolium and inner basal angle of cuneus paler, subtranslucent; membrane pale translucent with a faint dusky tinge, veins reddish; upper surface thinly clothed with fine prostrate yellowish hairs. Head scarcely one-fourth narrower than base of pronotum, vertex very wide, with basal carina prominent. Pronotum with calli prominent, rather widely separated. Length, 4.8—5 mm.

Lakehurst, N. J., May 29 (*Davis*). Washington, D. C., June 4 (*Gerhard*). Ranges from New England west to Colorado, not recorded south of District of Columbia. Breeds on pine.

760 (997). *DICHRROSCYTUS ELEGANS* Uhler, 1904, 356.

General color pale green, fading to greenish-yellow; elytra often strongly tinged with reddish; cuneus pale greenish-yellow with reddish markings; membrane pale greenish-translucent with veins of cells reddish; antennæ greenish, becoming dusky toward tip; legs greenish-yellow, the femora with vague reddish dots; beak and tarsal claws fuscous. Length, 2.8—3.2 mm.

Putnam Co., Ind., July 24—Oct. 1; beaten from red cedar, *Juniperus virginiana* L., where it occurred in company with *Parthenicus juniperi* (Heid.). Lakehurst, N. J., May 28, from white cedar (*Davis*). Ranges from Ontario and New England west to the Pacific and southwest to North Carolina and New Mexico, occurring on cedar throughout its range.

761 (—). *DICHRROSCYTUS VIRIDICANS* Knight, 1918b, 114.

Form and size of *elegans*. Differs in color as shown in key; head, coxæ and femora often turning pale to brownish; pronotum and scutellum often more yellowish-green; cuneus green with margins of apical half reddish; veins of membrane reddish or dull yellow; tip of cuneus blackish. Length, 3.2—3.3 mm.

New Ulm, Minn., June 20 (*Minn. Univ. Coll.*). Recorded only from New Hampshire and New York. Originally described as a color variety of *elegans* and that is probably its proper status.

762 (999). *DICHRROSCYTUS MACULATUS* Van Duzee, 1912a, 483.

Pale greenish-yellow, often with a pinkish tinge; pronotum usually immaculate, sometimes with a fuscous blotch on basal half; elytra with an oval spot on inner angle of clavus and a narrow transverse bar across apical third of corium, fuscous, these markings varying in size and intensity; membrane pale translucent with a dusky cloud across the apex and apical half of cells, veins and inner apical margin of cuneus usually reddish; under surface and legs pale greenish-yellow, apical third of hind femora and sides of abdomen sometimes reddish-fuscous. Joints

1 and 2 of antennæ greenish, 3 and 4 fuscous, 2 one-half longer than 3 and 4 united. Length, 3—3.5 mm.

Dunedin, Fla., Feb. 18—April 23; taken in numbers on red cedar, also singly at porch light (*W. S. B.*). Sevenoaks, Fla., May 1 (*Van Duzee*). Described from Sevenoaks and not recorded elsewhere. Easily known from our other species by the very large eyes and the fuscous markings of elytra.

IX. BOLTERIA Uhler, 1887a, 33.

Oblong, depressed species having the head broad, its front short, subvertical, not projected in front of eyes; vertex short, flat, carinate at base; eyes very large, reniform, contiguous with pronotum; tylus flat, cheeks long, convex; beak reaching third ventral, its basal joint broad, compressed; pronotum three-fourths wider at base than long, almost flat, declivent forward, calli small, widely separated; elytra entire, cuneus with a deep notch at base of outer margin. Four species are known, two of them from the southern states. They occur on pine.

KEY TO EASTERN SPECIES OF BOLTERIA.

- a.* Joint 1 of antennæ three-fourths as long as width of vertex; pronotum wholly pale brownish-yellow; membrane a uniform fuscous-brown. 763. LUTEIFRONS.
- aa.* Joint 1 of antennæ one-eighth longer than width of vertex; basal third of pronotum piceous-brown; membrane pale hyaline, the apical third of cells brown. 764. SEMIPICTA.

763 (—). BOLTERIA LUTEIFRONS Knight, 1921a, 73.

Head and pronotum pale yellowish-brown, the tylus, calli and collar somewhat darker; elytra testaceous, shining, subtranslucent; clavus and apical third of corium heavily tinged with fuscous, minutely pale pubescent; cuneus pale yellow, its apical third darker; membrane a uniform fuscous-brown; sterna brownish, shining; ventrals yellowish with paler pubescence. Joints 1—3 of antennæ testaceous, 4 infuscated, 1 as in key, 2 four times longer than 1, 3 two-fifths as long as 2. Structural characters as under generic heading. Length, 4.2 mm.

Known only by the single male type taken from pine by Van Duzee, April 17, near Raleigh, N. Car.

764 (—). BOLTERIA SEMIPICTA sp. nov.

Head, collar and calli of pronotum pale reddish-brown; median third and humeral angles of pronotum greenish-yellow; tylus and basal third of pronotum piceous-brown; scutellum piceous-brown, apex and basal angles paler; elytra greenish-yellow, translucent, apical two-thirds of

clavus, apical fourth of corium and a blotch on basal third of latter piceous; cuneus yellowish-hyaline, its extreme tip piceous; membrane as in key; femora pale yellow, apical half of hind pair piceous; tibiæ dull yellow; coxæ and middle of under surface pale yellow, sides with a broad piceous stripe extending from eye to apex of genital. Joints 1—3 of antennæ pale yellow, 1 as in key, 2 three and two-third times as long as 1, 3 one-third the length of 2, 4 fuscous, two-fifths as long as 3. Eyes extremely large, their long diameter more than twice the width of vertex. Pronotum finely transversely rugose. Upper surface thickly but finely pubescent. Length, 4.3 mm.

Dunedin, Fla., April 23; one male taken at electric porch light.

X. ADELPHOCORIS Reuter, 1896, 168.

Elongate, subparallel, pubescent species having the head porrect, wider across the eyes than long, its front subvertical, vertex with a short median impressed line; eyes very large, almost vertical; pronotum trapezoidal, twice as wide at base as long, its sides not carinate, hind portion convex, rugose, calli united at middle; scutellum large, triangular, almost flat, finely rugose; elytra entire, surpassing abdomen, cells of membrane both large, nearly equal in size, their tips angularly rounded. Two of the four North American species are known from our territory, and a third has been taken in Iowa and is therefore included.

KEY TO EASTERN SPECIES OF ADELPHOCORIS.

- a. Beak not surpassing hind coxæ; cuneus in part or wholly red.
- b. Second antennal in part reddish-yellow; elytra pale to dark brown with yellowish costal area; beak reaching onto hind coxæ. 765. RAPIDUS.
- bb. Second antennal black; elytra fuscous-black, the costal area red; beak reaching apex of middle coxæ. 766. SUPERBUS.
- aa. Beak reaching second ventral; cuneus pale greenish-white, its apex often piceous. 767. LINEOLATUS.

765 (966). ADELPHOCORIS RAPIDUS (Say), 1832, 20; I, 339.

Head reddish-brown, tylus darker; pronotum with calli reddish-brown, collar and basal portion of disk dull yellow, the latter with two rather large oval dark spots, these sometimes united to form a dark cross-bar; elytra pale to dark brown, their costal margins pale yellow, cuneus with inner two-thirds brown, tinged with reddish, or sometimes wholly reddish, the outer margin pale; membrane dusky, its veins darker; femora reddish-yellow, tibiæ and tarsi pale yellow, their tips darker. Joint 1 of antennæ blackish, gradually thicker from base toward apex, three-fourths the length of pronotum; 2 two and a half times longer

than 1, its base and apical third blackish, remainder reddish-yellow; 3 and 4 yellowish at base, darker toward tips, united longer than 2, 4 two-fifths the length of 3. Pronotum and elytra rather thickly clothed with prostrate yellow pubescence. Length, 7—8 mm. (Fig. 170).

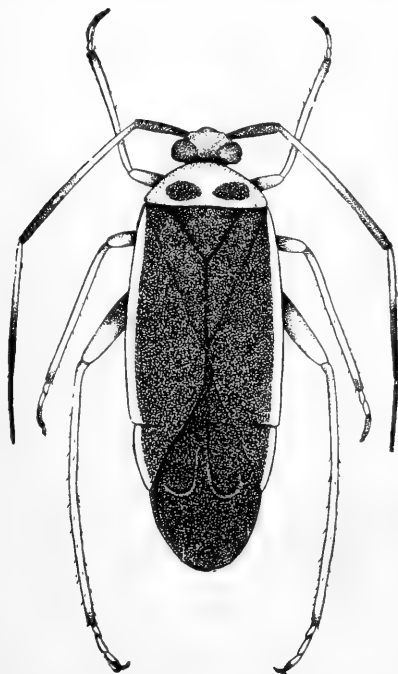


Fig. 170, X 8. (After Forbes).

Common throughout Indiana, June 5—Oct. 16. Occurs in summer on foliage and flowers of various plants, especially those of moist localities; in autumn in numbers on flowers of ironweed, goldenrod and other Compositæ. Breeds on *Rumex crispus* L. and other species of dock. Ranges from Quebec and New England to the Pacific, and southwest to Texas and New Mexico, but in the east not definitely recorded south of New Jersey, though specimens are at hand from Agricultural College, Miss. The older records are mainly under the generic name *Calocoris*. Known economically as the "cotton leaf-bug" and said to do much damage to cotton in Texas.

766 (967). *ADELPHOCORIS SUPERBUS* (Uhler), 1875, 838.

Elongate, subparallel. Upper surface dull red to scarlet, thinly clothed with fine yellowish hairs; clavus, inner apical two-thirds of corium and often the entire scutellum fuscous-black; cuneus usually wholly red. Membrane dark brown, dusky-translucent toward apex; legs dark brown to black, the coxæ and basal halves of hind femora paler; spines and tips of tibiæ fuscous. Joints 1 and 2 of antennæ dark brown to black, 3 and 4 reddish-brown, the base of 3 yellow. Basal two-thirds of pronotum finely but distinctly transversely rugose. Length, 7.5—8 mm.

Golden, Colo., and Ormsby Co., Nev., July (*Gerhard*). Recorded from Iowa and North and South Dakota, and therefore probably occurs in western Wisconsin and Illinois. Its recorded range extends from the Mississippi west to the Pacific. Hussey (1922a, 14) states that in his opinion it will prove to be but a western form of *rapidus*. One of the specimens at hand bears

out this surmise, as it has a brownish cross-bar across the base of scutellum and the middle of second antennal is faintly reddish.

767 (—). *ADELPHOCORIS LINEOLATUS* (Gœze), 1778, 267.

Elongate, subparallel, male, more oval, female. Grayish or greenish-yellow, sparsely clothed with inclined yellow hairs; pronotum often with two blackish spots near basal margin; scutellum with a blackish line each side of middle; apical half or more of inner margin of clavus, outer edge of embolium and a triangular spot on apical third of corium, blackish or piceous; membrane pale hyaline, the outer margin to tip of cuneus, fuscous, veins yellowish; legs pale brownish-yellow, femora flecked with black spots, tibiæ beset with short blackish setæ, tarsi brownish-yellow, claws brown. Joints 1 and 2 of antennæ pale brownish-yellow, 1 thickly clothed with very short inclined black hairs and with a few scattered longer erect ones; 3 and 4 and apex of 2 reddish-brown. Pronotum thickly and finely punctate. Scutellum finely transversely rugose. Length, 7—8 mm.

Chiltern Hills, England, August (*British Mus. Coll.*). A palæ-arctic European species known in this country only from Cape Breton Island, Nova Scotia. Occurs abundantly in Europe on *Chenopodium* and allied wayside weeds.

XI. *CALOCORIS* Fieber, 1858, 305.

Pubescent species of medium size having the head porrect, vertex not margined, front declivent; eyes large, emarginate each side; joint 1 of antennæ with but few minute hairs, cylindrical, slightly passing tip of tylus, not or scarcely longer than head, 2 linear, three times as long as 1, 3 slightly longer than 4; beak reaching second ventral; pronotum trapezoidal, its basal margin broadly rounded; elytra entire, longer than abdomen; hind femora not passing tip of abdomen; first joint of hind tarsi not or but slightly longer than second. One of the three known North American species occurs in the eastern states.

768 (985). *CALOCORIS NORVEGICUS* (Gmelin), 1788, 2176.

Elongate, subparallel, male, suboval, female. Color a uniform dull greenish-yellow, thinly clothed with inclined black and yellow hairs intermixed; pronotum usually with a small dark spot behind each callus; membrane dusky, the veins paler. Male often with a small blackish spot on the apex of corium. Length, 6.5—7 mm.

Staten Island, N. Y., July 17 (*Davis*). A palæarctic European species ranging in this country from Quebec and New

England west to British Columbia and southwest to New Jersey. Recorded also, probably in error, from Texas. Occurs on grasses, nettles, etc.

XII. HORCIAS Distant, 1884, 277.

Rather large oblong or oblong-oval glabrous shining species having the head wider across the eyes than long, its front strongly declivent; eyes large, prominent, contiguous to front margin of pronotum; joint 1 of antennæ stout, about as long as head, 2 twice as long as 1, or slightly more, gradually feebly thickened from base to apex, 3 and 4 much more slender, subequal in length; beak reaching or surpassing middle coxæ; pronotum trapezoidal, twice as wide at base as long, collar distinct, calli not prominent, basal portion convex and declivent forward, its surface usually almost smooth or with fine impressed points; scutellum nearly equilateral, slightly convex; elytra entire, cuneus and membrane deflexed; joints 1 and 2 of hind tarsi subequal, 3 slightly shorter than the other two united.

The species of this genus are extremely variable in color, no fewer than 14 color varieties of our common species, *H. dislocatus* Say, having been named. Distant (*loc. cit.*) described 11 new species from Central America, basing them mainly upon color characters alone. Two species are recognized from the eastern states.

KEY TO EASTERN SPECIES OF HORCIAS.¹

- a. Form oblong-oval; color extremely variable, but never shining black with scutellum wholly yellow; beak reaching hind coxæ. 769. DISLOCATUS.
 - aa. Form oblong, subparallel; color shining black, the scutellum usually yellow; beak reaching middle coxæ. 770. FALLAX.
- 769 (1000). HORCIAS DISLOCATUS (Say), 1832, 21; I, 339.

Oblong-oval. Tylus, upper half of cheeks, base of vertex, two oblong or subquadrate spots on basal half of pronotum, scutellum except a narrow median line, inner half of clavus and an oblique stripe on corium, black; membrane and apex of cuneus piceous; remainder of upper surface reddish or (var. *affinis* Reut.) dull yellow; under surface piceous with a pale line on meso- and metasterna; legs and prosternum yellow,

¹Uhler (1894, 263) described *Pæcilocapsus marmoratus* from Lower California and mentioned "fragments of specimens from Texas and Maryland" as being in his collection, "but not in condition for identification." Van Duzee, in his Catalogue, places it under *Horcias* as No. 1003. It is described as being pale yellow irrorated and marbled with brown, with two round brown dots behind calli of pronotum; length 4.3—5 mm. As no eastern record other than that of Uhler can be found, it is not farther considered in this work.

the tarsi in part fuscous; joints 1 and 2 of antennæ shining black, 3 and 4 and extreme base of 2 dull yellow to fuscous. Length, 6—7 mm.

St. Joseph, Marion and Vigo counties, Ind., May 10—June 15; probably found throughout the State. Occurs mainly on mullein, *Verbascum thapsus* L., but often swept from other plants in or along the margins of dense woodland. Ranges from Quebec and New England west to Wisconsin and North Dakota; not recorded south of New Jersey. In some specimens the entire elytra except the costal margin and base of radial vein are black. The form in which the pale color is dull yellow instead of red was described by Reuter (1876, 74) as *Pocillocapus affinis*. Say, in his original description, gives the color as "pale rufous or somewhat fulvous," thus including both forms. All of the Indiana specimens at hand with two black spots on base of pronotum are of this paler form and according to Knight's key of color varieties cited below, are *Horcias dislocatus affinis* (Reut.). Knight (1923, 608) states that the food plants are "false solomon's seal, *Smilacina racemosa* Desf., wild cranesbill, *Geranium maculatum* L., hare figwort, *Scrophularia leporcella* Bick., and occasionally blue cohosh, *Caulophyllum thalictroides* (L.)."

As already noted, the color of this Mirid is exceedingly variable. Knight gives a key to 14 varieties, including the typical form as above described. These color varieties have practically the same distribution and occur on the same plants as the typical form. As five of them are quite common and fairly constant in hue, the following modification of his key is given for their separation.

KEY TO FIVE COLOR VARIETIES OF HORCIAS DISLOCATUS.

- a. Pronotum not wholly black.
 - b. Disk of pronotum red with basal half in part black, but without spots as in typical *dislocatus*. 769a. GONIPHORUS.
 - bb. Pronotum wholly red.
 - c. Elytra red or only slightly infuscated; scutellum wholly black, rarely with a pale median line. 769b. COCCINEUS.
 - cc. Elytra wholly black. 769c. RESIDUUS.
- aa. Pronotum wholly black.
 - d. Elytra with costal margin and often the base of radius pale. 769d. MARGINALIS.
 - dd. Elytra wholly black or with only base of radius pale; femora black, tibiæ chiefly pale. 769e. NIGRITA.

769a (1000b). *HORCIAS DISLOCATUS GONIPHORUS* (Say), 1832, 21; I, 341.

Pronotum red with yellow collar and a single black spot of variable

size on middle of its basal half; scutellum, clavus except base and inner apical half or more of corium black; femora, coxæ and usually the basal half or more of tibiæ, piceous. (Fig. 171).

St. Joseph, Marshall, Marion, Putnam and Vigo counties, Ind., May 15—June 14. Say considered this a distinct species and mentioned four color varieties. A form in which the red hue is replaced by dull yellow is frequent and was described by Walker (1873, 93) as *Capsus limbatellus*.

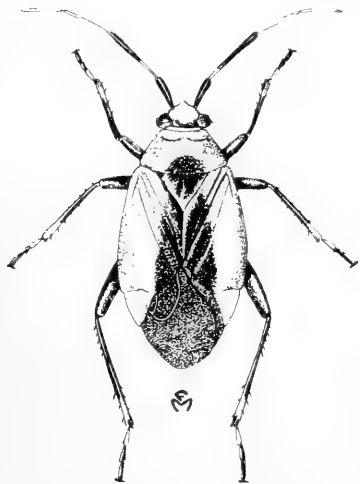


Fig. 171, X 6. (Original).

769b (1000a). *HORCIAS DISLOCATUS COCCINEUS* (Emmons), 1854, pl. 30, fig. 2.

Pronotum except collar, wholly red; scutellum usually wholly black, sometimes with a yellow median stripe; elytra and legs as in the typical form, the former often with only the clavus in part red.

Marion, Putnam, Vigo, Crawford and Perry counties, Ind., May 16—June 20. Often occurs in numbers on the foliage of the great ragweed, *Ambrosia trifida* L., growing along margins of streams.

769c (1000g). *HORCIAS DISLOCATUS RESIDUUS* Van Duzee, 1912a, 484; 1916, 39.

Pronotum wholly red; elytra and scutellum uniformly black.

Known from Ohio, Indiana and Minnesota.

769d (1000d). *HORCIAS DISLOCATUS MARGINALIS* (Reuter), 1876, 75.

Wholly piceous-black with only the narrow edge of costal margin and sometimes the basal third of radial vein of elytra pale.

Described from New York, not recorded elsewhere.

769e (1000e). *HORCIAS DISLOCATUS NIGRITA* Reuter, 1909, 41.

Black or piceous-black; face, joints 3 and 4 of antennæ, tibiæ, tarsi and beak wholly or in part paler.

Taken sparingly in Indiana as far south as Owen Co., May 17—July 10. Occurs with the typical form throughout its range, more often in moist places. The variety *pallipes* Van D. (1912, 484) differs only in having the legs pale. Reuter (loc.

cit.) states that *nigrita* and *marginalis* are only dark color varieties of his *affinis*, which, as above stated, is but a pale form of *dislocatus*.

770 (1002). *HORCIAS FALLAX* Reuter, 1909, 42.

Oblong, subparallel. Black or piceous-black; scutellum usually wholly reddish-yellow or with only its basal angles dark, rarely wholly dark; membrane dusky-translucent; legs and beak pale dull yellow, apical joints of tarsi fuscous; antennæ with joint 1 and basal half of 2 reddish-yellow, remainder fuscous-black. Joint 2 of antennæ two and three-fourth times longer than 1. Length of pronotum, about two-fifths shorter than its basal width; its disk shallowly and sparsely punctate. Length, 5.8—6.2 mm.

Fountain, Marion and Vigo counties, Ind., scarce, June 8—Aug. 8. Occurs on foliage of red-bud, *Cercis canadensis* L. Described from Greensburg, Pa., and heretofore recorded only from there.

XIII. *PÆCILOCAPSUS* Reuter, 1876, 73.

Elongate, subparallel, shining glabrous species having the head short, nearly twice as wide across eyes as long; front vertical, strongly convex; beak slender, not reaching middle coxæ; pronotum subtrapezoidal, twice as wide at base as long, disk with collar and calli prominent, hind portion convex, somewhat flaring, almost smooth, hind margin broadly rounded; scutellum triangular, equilateral, almost flat; elytra entire, surpassing abdomen, constricted at base of cuneus; hind tarsi with joints 1 and 2 subequal, 3 longer. One species and a variety occur in North America and our territory.

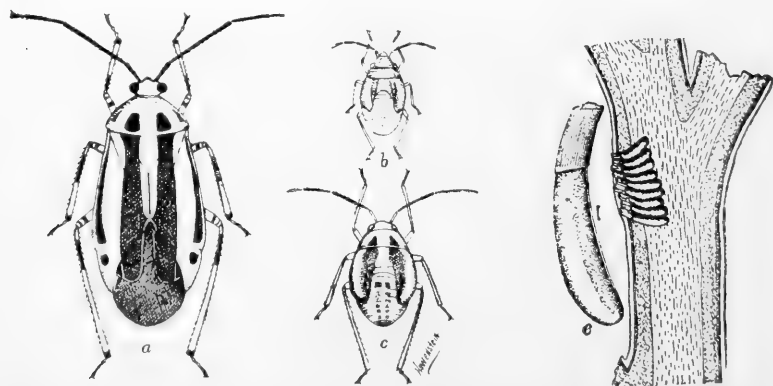


Fig 172. *a*, adult X 5; *b* and *c*, nymphs; *d*, eggs. (After Lugger and Slingerland).

771 (1004). *PÆCILOCAPSUS LINEATUS* (Fabricius), 1798, 541.

Elongate-subparallel, male, elongate-oval, female. Head, front portion of pronotum and under surface reddish-yellow, basal half of pronotum greenish or lemon-yellow with four oblong black spots, the ones on sides narrower, sometimes wanting; elytra lemon-yellow, each with two black stripes, one submarginal, reaching cuneus, narrow at base, dilated toward apex, the other much wider, reaching from base of clavus to membrane; tip of tylus black; cuneus usually with a round median black spot; membrane brownish-translucent; legs yellow, apical third of femora with two black rings, basal third of hind tibiæ usually with one. Antennæ shorter than body, joints 1 and 2 black, their bases pale; 1 about as long as head, gradually slightly thickened from base to apex; 2 almost linear, slightly swollen toward apex, nearly three times as long as 1, thickly clothed with black bristle-like hairs; 3 and 4 fuscous, much more slender, united slightly shorter than 2, 3 twice the length of 4. Length, 7—7.5 mm. (Fig. 172).

Frequent throughout Indiana, May 20—July 8. Known as the “four-lined leaf-bug,” and in Indiana occurs on mullein, thistles, vervain, etc. Recorded from Jacksonville, Atlantic Beach and Lakeland, Fla. Ranges from Quebec and New England west to the Dakotas and British Columbia, and southwest to Florida, Texas and New Mexico. At times it becomes abundant enough to do much damage to the foliage of currants, dahlias, parsnips and other cultivated plants. Lintner (1882, 271) has given a full account of its life history and names 30 species of garden plants and weeds upon which it feeds.

771a (1005). *PÆCILOCAPSUS LINEATUS NIGRIGER* (Stal), 1862, 319.

Differs from typical *lineatus* only in being somewhat shorter and more oval, usually more greenish-yellow with dark stripes of elytra wider and a deeper black, and the spot on middle of cuneus larger and more prominent. Length, 6.5—7 mm.

Dunedin, Fla., Dec. 15—April 20. Frequent in spring on *Sida spinosa* L. and other herbs in low moist places. This is the form recognized by Van Duzee (1909, 178) from Florida as the *P. nigriger* Stal. Of it he says: “Not uncommon at all localities. This species has the head and anterior portion of pronotum bright fulvous and the cuneus has a large central black spot. Otherwise it differs little from our northern *lineatus* Fabr.” I consider it, as did Uhler (1884, 287), only a southern variety or race of *lineatus*. It was described from Mexico and has been recorded from California.

Division II.—CAPSARIA Douglas & Scott, 1865, 32.

The members of this division of the tribe Capsini are, for

the most part, oval, shining species with the upper surface, or at least the pronotum, distinctly punctate; antennæ shorter than body and collar and calli distinct. The division is represented in the eastern states by ten genera, separated as follows:

KEY TO EASTERN GENERA OF CAPSARIA.

- a.* Joint 2 of antennæ clavate; cheeks swollen and convex; vertex broad, foveate, distinctly transversely striate each side near eyes.

XIV. CAPSUS, p. 752.

- aa.* Joint 2 of antennæ linear or nearly so.

- b.* Second antennal thickened, nearly as thick as basal one, not, male, or but slightly, female, attenuate near base.

- c.* Second antennal about twice as long as basal one, very finely pubescent.

XV. NEOCAPSUS, p. 753.

- cc.* Second antennal distinctly more than twice as long as basal one, thickly clothed with heavy black pubescence.

- d.* Vertex convex, shining, its base not carinate; color in great part red; form suboval, distinctly widened behind middle.

XVI. COCCOBAPHES, p. 754.

- dd.* Vertex more flattened, its basal margin distinctly carinate; color, in part fuscous; body oblong, subparallel.

XVII. LYGIDEA, p. 755.

- bb.* Second antennal distinctly thinner at base than apex, always noticeably thinner than basal one.

- e.* Pronotum in front of collar and between calli subconvex, not punctured.

- f.* Beak reaching base of seventh ventral; front of head alutaceous, finely transversely striate; upper surface practically glabrous.

XVIII. PLATYLYGUS, p. 757.

- ff.* Beak rarely passing tips of hind coxæ; front of head without striæ, or if striate, the upper surface pubescent.

XIX. LYGUS, p. 758.

- ee.* Pronotum distinctly punctate in front of collar and between calli.

- g.* Side margins of pronotum carinate; form more ovate.

- h.* Joint 1 of antennæ distinctly thicker than joint 2, both joints black; color red and black.

XX. TROPIDOSTEPTES, p. 784.

- hh.* Joint 1 of antennæ slender, scarcely as thick as joint 2 at apex, both joints in part or wholly pale or reddish; eyes very large, overlapping front angles of pronotum.

- i.* Corium smooth, opaque; vertex not margined at base; length less than 3 mm.

XXI. CYRTOCAPSIDEA, p. 784.

- ii.* Corium distinctly punctate; vertex carinate at base; length 4 or more mm.

XXII. NEOBORUS, p. 785.

- gg.* Side margins of pronotum not carinate; form more elongate, sides subparallel.

XXIII. XENOBORUS, p. 792.

XIV. CAPSUS Fabricius, 1803, 241.

Short oval, rather robust species having the head porrect, nearly twice as wide at base as long, its front subvertical and

vertex foveate; beak reaching hind coxæ; pronotum trapezoidal, one-half wider at base than long, sides straight, not carinate, disk, except calli, thickly and coarsely punctate; scutellum triangular, almost flat, equilateral; elytra entire, surpassing abdomen, clavus, cuneus and membrane deflexed; hind tarsi with joints 1 and 2 subequal, 3 almost as long as both united. One species occurs in North America and our territory.

772 (1008). *CAPSUS ATER* (Linnæus), 1758, 447.

Oblong-oval. Male black or piceous-black, shining, sparsely clothed with fine prostrate grayish hairs; membrane brownish-translucent. Antennæ much shorter than body, joints 1 and 2 black, 3 and 4 fuscous, 3 pale at base; 1 as long as head; 2 strongly clavate, thickly pilose, three times as long as 1; 3 and 4 very slender, subequal, united one-fourth shorter than 2. Female often with head and pronotum reddish- or orange-yellow, var. *semiflavus* (Linn.). Length, 5.5—6 mm.

Marshall, Steuben and Marion counties Ind., June 11—18. Dunedin, Fla., Feb. 27 (*W. S. B.*). Palos Park, Ill., June 22 (*Gerhard*). Natick, Mass., May 11 (*Frost*). The specimens at hand are mostly the var. *tyrannus* Fabr., in which the legs are reddish yellow, the femora with two subapical dark brown rings and tips of tibiæ fuscous. Those from Indiana were swept from herbage in tamarack swamps or dense woodland. It is an introduced European species, its present known range in this country extending from Ontario and New England west to South Dakota and Edmonton, Alberta, and south to Florida, though Uhler (1878, 411) states that "it is found from the extreme north of British America to the southern parts of the United States." Knight states that the food plants are wire grass, *Poa compressa* L., couch grass, *Agropyron repens* (L.) and probably other grasses. Hussey recorded it as common in the hay fields and meadows of Berrien Co., Mich., during the early summer. Not before definitely recorded south of New Jersey.

XV. *NEOCAPSUS* Distant, 1884, 277.

Oblong-oval, shining species closely allied to *Horcias*, but having the pronotum and corium coarsely punctate; beak reaching hind coxæ; second joint of antennæ twice as long as first, but not strongly swollen or pilose; pronotum with humeral angles obliquely rounded, the hind margin twice as wide as apex; tibiæ strongly setose. A variety of one of the two known species occurs in our territory.

773 (—). *NEOCAPSUS CUNEATUS LEVISCUTATUS* Knight, 1925b, 79.

Shining black, subglabrous; front of head reddish, tylus in part black; pronotum and scutellum orange-red, the former with calli, narrow area behind collar and subbasal margin blackish; cuneus reddish-ochraceous. Pronotum shallowly and sparsely punctate. Scutellum wholly smooth. Length, 5.5—5.9 mm.

Recorded from Linnville Falls, N. Car., and Agricultural College, Miss. Distinguished from typical *cuneus* Distant (1893, 438) only by the smooth yellow scutellum, which in that species is black and “irregularly transversely striate.”

XVI. *COCCOBAPHES* Uhler, 1878, 401.

Elongate-oval, widest behind middle; head about as wide as long, porrect, front vertical; beak reaching hind coxæ; pronotum subtrapezoidal, one-half wider at base than long, sides rounded, calli smooth and prominent, united at middle; disk behind them convex, densely and rather finely punctate; scutellum equilateral, feebly convex, its base broadly exposed; elytra entire, surpassing abdomen, cuneus acutely narrowed at tip; joint 2 of hind tarsi longer than 1, a little shorter than 3. One species is known.

774 (1009). *COCCOBAPHES SANGUINAREUS* Uhler, 1878, 401.

Color a nearly uniform bright red, sparsely clothed with semipros-trate yellow hairs; tylus black; clavus rarely clouded with dusky each side of commissure; membrane translucent dusky, its veins reddish-brown; tibiæ and tips of beak and tarsi fuscous. Joints 1 and 2 of antennæ black, 3 pale yellow, 4 tinged with fuscous; 1 pale at base, slightly shorter than pronotum, feebly thickened from base to apex; 2 two and one-half times as long as 1, linear, male, its base and apex slightly narrowed, female; 3 and 4 very slender, subequal, together one-sixth shorter than 2. Elytra finely and densely rugose-punctate. Length, 7.5—8 mm.

Steuben, Tippecanoe, Marion and Putnam counties, Ind., June 5—July 24. Dunedin and Lake Okeechobee, Fla., March 2—23; not before recorded from that State. Occurs on foliage of hard and red maple. Ranges from Ontario and New England west to Michigan and Iowa and south to North Carolina and Florida. Uhler (loc. cit.) mentions a specimen from Canada as having “the inner half of hemelytra black from behind the base of the clavus along its whole breadth to the base of the membrane.” He also records it from North Carolina, which is the only record south of New Jersey. Hussey found it common in June and July on hard maples in the dune forests of southern Michigan.

XVII. LYGIDEA Reuter, 1875a, 547.

Elongate or oblong, finely pubescent species having the head about as wide as long, porrect, its front vertical; beak reaching or passing the middle coxæ; antennæ stout, shorter than body, thickly pilose, joint 1 longer than head, 2 about three times as long as 1, 3 nearly half the length of 2, 4 usually more than half as long as 3; pronotum subtrapezoidal, its width of base slightly less than twice its greatest length, sides feebly sinuate, disk except calli and collar rather coarsely punctate; scutellum flat, mesoscutum but slightly exposed; elytra oblong-subparallel, entire, nearly flat, cuneus but slightly deflexed; joints 1 and 2 of hind tarsi subequal. Five of the seven known North American species occur in the eastern states.

KEY TO EASTERN SPECIES OF LYGIDEA.

- a. Beak scarcely reaching hind margins of middle coxæ.
 - b. Length of first antennal not or but slightly greater than width of vertex; pubescence of elytra dense and closely appressed; cuneus chiefly red, upper surface of female usually in great part red. 775. ROSACEA.
 - bb. Length of first antennal two-fifths greater than width of vertex; pubescence of elytra less dense, chiefly suberect; cuneus mostly pale, red only along inner margin and apex.
 - c. Basal half of pronotum rugose with fine punctures between the rugæ; antennæ dark brown; beak reaching behind the middle coxæ. 776. RUBECULA.
 - cc. Basal half of pronotum coarsely punctate; antennæ in great part black; beak not reaching hind margins of middle coxæ. 777. VIBURNI.
- aa. Beak reaching between hind coxæ.
 - d. Color chiefly fuscous-brown to blackish, ground color pale to greenish, never reddish. 778. OBSCURA.
 - dd. Color orange-red, clavus, inner half of corium and usually the basal margin of pronotum more or less fuscous to blackish. 779. MENDAX.

775 (1010b). LYGIDEA ROSACEA Reuter, 1909, 46.

Greenish-yellow, usually heavily tinged with reddish, the elytra thickly pubescent with prostrate yellowish hairs; head with oblique red lines each side of front; pronotum dull red, the collar and an oblong median spot yellowish; scutellum red, a narrow median line and apex yellow; elytra with clavus and apical half of corium in great part reddish-fuscous, embolium and basal half and narrow costal margin of both corium and cuneus yellow; membrane dusky, its veins paler; legs greenish-yellow, the femora more or less reddish; joints 1 and 2 of antennæ reddish-yellow, the apex of 2 and all of 3 and 4 fuscous. Basal half of pronotum sparsely, coarsely, shallowly and unevenly punctate. Length, 6.5—6.7 mm.

Chicago and Willow Springs, Ill., June 4—30; at light and on willow (*Gerhard*). Described from there by Reuter as a variety of *rubecula* Uhl., and raised to specific rank by Knight (1923, 570). Known from Illinois, Minnesota and Colorado. Taken by Knight only on sand-bar willow, *Salix longifolia* Muhl.

776 (1010). *LYGIDEA RUBECULA* (Uhler), 1895, 37.

Dull greenish-yellow, sparsely clothed with very fine yellowish inclined hairs; head with tylus and usually a curved line each side of face, dark brown; pronotum with collar ivory-white, disk greenish-yellow, more or less tinged with reddish-brown, the basal fourth often with a narrow fuscous cross-bar, this projected forward over the basal angles and edged behind with paler; scutellum either yellow with sides narrowly darker or pale brown with median line and base yellow; elytra with clavus and inner half of corium fuscous-brown; outer half of corium and cuneus in great part yellow; membrane with cells dusky, paler toward apex, the veins yellowish; legs and under surface greenish-yellow. Length, 6—6.5 mm.

Highlands, N. Car., July 6 (*Brimley*). Described from Colorado and northern Illinois and recorded from various localities from Ontario and New England west to the Pacific, but part of the records undoubtedly refer to *rosacea*, *obscura* and other species.

777 (—). *LYGIDEA VIBURNI* Knight, 1923, 569.

Brownish-yellow, clothed with suberect yellowish pubescence; pronotum with calli, basal margin each side of median line and sometimes a ray each side of disk behind calli, dark brown to blackish; scutellum yellowish-brown, darker each side of median line; membrane fuscous-brown, veins and spots near apex of cuneus, paler; legs yellowish, apical third of femora often reddish-brown; ventrals pale yellowish, upper half of sides and genital region brownish-black. Antennæ brownish-black basally, fuscous apically, about two-thirds the length of body, joint 1 two-thirds as long as width of vertex; 2 three times as long as 1; 4 less than half the length of 3, male, three-fifths the length of 3, female. Length, 7 mm.

Batavia, N. Y., June 24 (*Minn. Univ. Coll.*). Recorded only from Batavia, where it breeds on the nanny-berry, *Viburnum lentago* L.

778 (1010c). *LYGIDEA OBSCURA* Reuter, 1909, 46.

Ground color of male dark fuscous to black, of female yellowish to brownish, darkened with fuscous; male with median line on front, cheeks, median line and narrow basal margin of pronotum, side margins and median line of apical half of scutellum, dull yellow; cuneus pale translucent, inner half reddish, apex darker; membrane blackish, veins and spot near tip of cuneus paler; legs blackish, the coxæ, basal half of

femora and middle of tibiæ paler; under surface dull yellow. Antennæ dark brown, joints 2—4 pilose, 3 two-fifths the length of 2, 4 one-half as long as 3. Pronotum short and broad, hind portion coarsely punctate. Female with head yellowish, the tylus and spot each side of vertex black; pronotum brownish, side margins broadly and a ray behind calli black, hind femora with blackish subapical band; otherwise like male. Length, 6 mm.

Honeoye Falls, N. Y., June 27 (*Minn. Univ. Coll.*). Known only from there and Lake Placid, N. Y. Occurs on black willow, *Salix nigra* L.

779 (1011). *LYGIDEA MENDAX* Reuter, 1909, 47.

Color as in key; tylus black; scutellum either wholly orange-red or with sides darker; membrane, hind tibiæ and first and second antennals fuscous; femora and front and middle tibiæ greenish; tarsi and third and fourth antennals dusky. Pronotum densely and rather finely rugose-punctate. Scutellum distinctly transversely striate. Clavus rugosely punctate; corium finely and closely so. Length, 6.3—6.5 mm.

Knox and Daviess counties, Ind., June 19 (*W. S. B.*). Henderson, Ky., June 11 (*Marshall*). Portage, N. Y., on *Cratægus* (*Gerhard*). Yaphank, N. Y., June 26 (*Davis*). Milford, Conn., June 4 (*Porter*). Occurs mainly on apple, quince, red haw, etc., and in the eastern states proving a serious pest to apple. The known range extends from New England west to Illinois and Kentucky. The pronotum in the Indiana specimens is without the usual blackish bar across the basal third, but this, as Reuter states (*non tamen semper*) is not an essential character as one would suppose by Knight's key (1923, 569).

XVIII. *PLATYLYGUS* Van Duzee, 1915, 111.

Oblong, shining species having the head half as wide as base of pronotum, nearly horizontal, its length subequal to width across eyes; vertex opaque, obliquely striate and with a short median sulcus, its basal carina slightly angulate at middle; pronotum transverse, moderately declivent, calli prominent, contiguous; elytra entire, sides parallel or nearly so, cuneus long, nearly horizontal; second joint of hind tarsi distinctly shorter than first or third. "Differs from *Lygidea* by the longer first joint of hind tarsi, more produced and subhorizontal head, opaque vertex with angled basal carina, longer basal joint of antennæ, longer rostrum, more slender pronotal collar and more irregular and distinct pronotal punctuation." (*Van Duzee*).

780 (1013). *PLATYLYGUS LURIDUS* (Reuter), 1909, 46.

Pale brownish-yellow, the upper surface sub-glabrous, strongly shining; collar and tip of scutellum dull yellow; elytra sub-translucent; disk of scutellum, apex and inner half of cuneus, apical halves of femora and ventrals often strongly tinged with reddish; membrane pale fuscous-brown, veins yellowish. Joints 1 and 2 of antennæ dull yellow, 1 surpassing tylus by half its length, 2 scarcely thinner and two and a half times as long as 1; 3 and 4 fuscous, distinctly thinner than and together about two-thirds the length of 2. Length, 6.5—7 mm.

Ithaca, N. Y., July 13 (*Minn. Univ. Coll.*). Recorded only from New Hampshire and New York. Occurs on white pine.

XIX. *LYGUS* Hahn, 1831, 147.

Oblong- or elongate-oval, usually finely pubescent species having the head porrect, inserted in thorax to eyes; face vertical, tylus prominent, higher than cheeks, its base on a line between the bases of antennæ; vertex, except in *pabulinus*, with a basal carina in front of which there is usually a subtriangular depression; eyes prominent, oval, their inner margins concave; beak reaching onto hind coxæ, rarely shorter (*campestris*) or longer (*approximatus*); antennæ shorter than body, finely pubescent, joint 1 shortest, 2 longest, usually slightly thickened on apical half, 3 and 4 much more slender; pronotum trapezoidal, broader at base than long, collar distinct, hind portion moderately convex, sides not margined, disk punctate except on calli and the smooth elevated area in front of them; scutellum equilateral, slightly elevated above clavus; elytra entire, passing tip of abdomen; cuneus oblong-triangular, rather strongly deflexed; tibiæ armed with spines whose length equals or surpasses the thickness of the tibia; first joint of hind tarsi very little longer than second. The genus is a very large one, about 60 species being known from North America, 39 of which occur in the eastern states.

KEY TO EASTERN SPECIES OF GENUS *LYGUS*.

- a. Beak reaching fourth ventral; pronotum rather closely, finely and shallowly punctate; collar and tip of scutellum white; male very slender and nearly black. 781. *APPROXIMATUS*.
- aa. Beak not surpassing second ventral.
 - b. Length of second antennal less than or scarcely equalling width of head across eyes; basal carina of vertex very low; color yellowish-brown to dark reddish-brown, darkened with fuscous. 782. *RUBICUNDUS*.
 - bb. Length of second antennal greater than width of head.

- c. Second antennal distinctly shorter than width of pronotum at base; head very broad, its width more than one-half that of pronotum at base.
- d. Smaller, length not over 4.5 mm.; general color dull greenish-yellow. 783. FASCIATUS.
- dd. Larger, length 5.8 mm.; general color dark reddish with black markings. 784. SUPERIORENSIS.
- cc. Second antennal longer than width of pronotum at base, or if not, then the head not conspicuously broad and length of insect more than 4.5 mm.
- e. Vertex with basal carina obsolete, represented by an impressed line at middle, apparent only near eyes; color a uniform green, or greenish-yellow fading to dull straw-yellow; membrane with an inverted Y-shaped fuscous mark. 785. PABULINUS.
- ee. Vertex with basal carina distinct; color variable.
- f. Pronotum coarsely or at least distinctly punctate; body covering heavily chitinized; left genital clasper of male without a prong at middle; right clasper with a curved claw at tip which is shorter than the greatest width of clasper (fig. 173, A).
- g. Beak reaching to or near posterior margins of hind coxæ.
- h. Color chiefly green, often with reddish lines; tibiæ pale greenish, not annulated near base; eyes very large, in male nearly twice as long as wide. 786. APICALIS.
- hh. Color yellowish-brown to blackish or reddish; tibiæ annulated with darker near base.

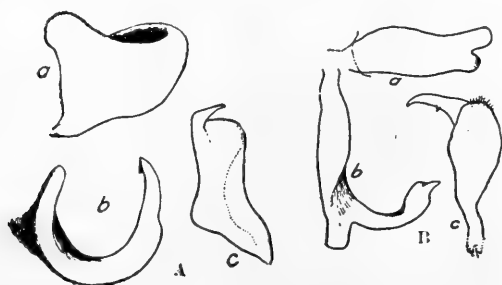


Fig. 173. A, genital claspers of male of *Lygus pratensis* (Linn.); B, same of *Lygus (Neolygus) communis* Knight. a, left clasper, side view; b, left clasper, dorsal view; c, right clasper, internal side view. (After Knight, Hemiptera of Connecticut).

- i. Elytra blackish, irregularly mottled with small yellowish pubescent spots; head and front part of pronotum yellowish-green, the pronotum usually with two blackish dots or rays behind each callus. 787. PLAGIATUS.
- ii. Elytra sometimes dark, but not mottled with paler; head and pronotum otherwise colored.
- j. Pubescence of upper surface distinct; smaller, length 4.8—6 mm.; color variable. 788. PRATENSIS.
- jj. Nearly glabrous, strongly shining; larger, length 6.5—7.5 mm.; color greenish- or brownish-yellow, sometimes ruby-red; pronotum with a black dot behind each callus and a black spot near basal angles. 789. VANDUZEEI.

gg. Beak not surpassing hind margins of middle coxæ; scutellum bright yellow or greenish-yellow; length less than 4.5 mm.

790. CAMPESTRIS.

ff. Pronotum very finely punctate; body covering more thinly chitinized and therefore more fragile; left clasper of male with prong at middle, right clasper with an apical hook or prong, this as long as or longer than thickest part of clasper (fig. 173, B).

Subgenus NEOLYGUS, p. 767.

781 (1029). *LYGUS APPROXIMATUS* (Stal), 1858, 185.

Male—Elongate, slender, sides subparallel. General color black; collar and tip of scutellum white; narrow basal margin and lower margin of flanks of pronotum and inner basal angle of cuneus, dull yellow; tips of embolium and cuneus reddish-brown; membrane fuscous, basal half of cells and a spot beyond apex of cuneus, pale, veins reddish; legs yellowish to greenish, hind femora tinged with fuscous or reddish-brown; ventrals black. Joints 1 and 2 of antennæ greenish-yellow, 1 two-fifths longer than width of vertex; 2 three and two-third times longer than 1; 3 and 4 fuscous, 3 one-half as long as 2; 4 two-thirds the length of 3. Head very long, front subvertical, basal carina of vertex prominent. Pronotum shallowly, rather sparsely punctate. Basal half of scutellum rather coarsely transversely rugose. Elytra minutely punctate, finely scabrous. *Female*—More robust than male. Dark reddish to brownish; tylus black; pronotum with sides and usually the basal margins fuscous to blackish; femora and ventrals dull yellow, tinged with reddish. Head longer and less deflexed than in male; second antennal only three times longer than first. Length, 4.8—5 mm.

Whiteface Mountain, N. Y., Aug. 22 (*Minn. Univ. Coll.*). Ranges from Nova Scotia and New England west to British Columbia and Alaska. Occurs in July and August on golden-rod, especially on the slopes of mountains north of latitude 44°; also on hemlock.

782 (1037). *LYGUS RUBICUNDUS* (Fallen), 1829, 92.

Oblong-oval, rather robust. Dark reddish-brown, rather thickly clothed with fine silvery-gray or yellowish appressed pubescence which on the elytra is often condensed to form small spots; head greenish-yellow, the tylus and some streaks on vertex reddish; basal half of pronotum usually blotched with fuscous, this often in the form of four to six short, broad stripes, the edge of hind margin pale yellow; scutellum more or less tinged with fuscous, a vague median line paler, the extreme tip ivory-white; apical half of corium and sometimes the clavus usually heavily tinged with fuscous; cuneus and basal half of embolium yellowish-translucent, edges and tip of cuneus often reddish; membrane dusky, the cells darker, veins yellowish; antennæ reddish-brown, apical third of joint 2 fuscous; legs reddish-brown, apical third of femora with two dark rings; under surface usually fuscous, the prosternum, middle of ventrals 1—4, a stripe along sides and spiracles pale, sometimes, especially in females, with under surface and legs wholly reddish-brown.

Head short and broad. Joints 1 and 2 of antennæ short and stout; 1 slightly shorter than width of vertex, 2 nearly three times as long as 1, 3 and 4 slender, subequal in length, united one-fifth shorter than 2. Beak reaching base of hind coxæ. Pronotum nearly twice as wide at base as long, disk, except calli, also the scutellum, finely transversely rugose, shallowly punctate between the rugæ. Elytra finely and closely punctate. Length, 4.7—5.2 mm.

Marshall and Marion counties, Ind., June 24—Sept. 28; frequent on weeds and willows along the banks of White River (*W. S. B.*). Washington, D. C., and Columbus, Ohio, July (*Gerhard*). Bloomsburg, Pa., and Fairfax Co., Va., June—September (*Davis*). A European species ranging in this country from Ontario and New England west to the Pacific and southwest to Georgia and Texas. Uhler (1892, 183) redescribed it as *Hadrodema pulverulenta* and stated that it often occurred in gardens on the blossoms of privet, *Ligustrum vulgare* L. Knight found it breeding in June near Batavia, N. Y., on the peach-leaved willow, *Salix amygdaloides* Anders, and also in scattering numbers on other willows.

783 (1023). *LYGUS FASCIATUS* Reuter, 1876, 72.

Oblong-oval. Dull greenish-yellow, rather thickly clothed with semiprostrate fine yellowish hairs; scutellum reddish, the median line and tip usually paler, sometimes green or yellow with only a few red dots on sides (var. *viridiusculus* Knight); inner half of clavus and inner apical angles of corium reddish-piceous; membrane dusky marbled with paler; legs pale yellow, hind femora with apical half reddish, a narrow preapical ring and knees pale, basal fifth of tibiæ usually red. Head very broad with eyes large, overlapping front angles of pronotum as in *Dichroscytus*. Joints 1 and 2 of antennæ greenish-yellow, the latter more than three times as long as 1, its apex blackish, 3 dusky, paler at base, 4 fuscous, one-half as long as 3. Pronotum and scutellum finely transversely strigose, with minute punctures between the strigæ. Elytra finely, densely, evenly punctate. Length, 4—4.5 mm.

Mineral Springs, Lake Co., Ind., Oct. 2 (*Gerhard*). Sanford, Dunedin, Ft. Myers, Miami, R. P. Park and Istokpoga, Fla., Nov. 19—April 23 (*W. S. B.*). Common about Dunedin in late autumn and early spring both on the mainland and Hog Island; occurring on low herbage in waste moist places, on the foliage of the groundsell tree, *Baccharis halimifolia* L., and at porch light. Described from South Carolina and ranges from New England and New York southwest to Florida, Texas and the West Indies. The *Lygus olivaceus* Reut. (1907b, 6), described from Jamaica, is a synonym, probably based on the female of *fasciatus* and the previous Florida records have been under that

name. Knight records it as breeding on the button-bush, *Cephalanthus occidentalis* L. Among the 42 specimens at hand there are all gradations between typical *fasciatus* and the so-called var. *viridiusculus* Knight (1917, 600).

784 (—). *LYGUS SUPERIORENSIS* Knight, 1917, 572.

Oblong-oval. Head black, curved basal carina of vertex pale, loræ and tylus dark red; disk of pronotum reddish, sides reddish-brown, calli black, inner half of each with a reddish spot; scutellum reddish-black, tip pale; elytra dark reddish translucent, tips of embolium and cuneus and spot on latter near embolium blackish; membrane pale hyaline, apical half of cells brownish, veins reddish; femora reddish-brown, twice annulate with blackish near tips; tibiæ reddish-brown, tips, spines and spot near knees darker; tarsi reddish-brown, tips blackish; sternum black, opaque; ventrals dark reddish. Beak reaching third ventral. Second antennal two-thirds longer than width of head across eyes. Pronotum finely punctate, strongly shining. Scutellum coarsely punctate, transversely rugose. Upper surface sub-glabrous. Length, 5.8 mm.

Known from a single male taken at Sault Sainte Marie, Mich.

785 (1014). *LYGUS PABULINUS* (Linnæus), 1761, 253.

Elongate-oval. Color as in key, sparsely clothed with minute inclined brownish hairs; membrane pale translucent, usually (var. *signifer* Reut.) with a fuscous mark in apical third of the large cell and a V-shaped mark beyond it, the two forming a crude inverted Y; spines of tibiæ and tips of tarsi fuscous. Head relatively small and pointed, vertex convex, shining. Antennæ with joint 1 and basal half of 2 greenish, remainder fuscous; 1 two-thirds the length of pronotum, 2 more than three times the length of 1, 3 nearly two-thirds the length of 2, one-third longer than 4. Pronotum very finely and densely rugose-punctate. Scutellum minutely transversely strigose. Elytra with minute rather sparse, shallow punctures. Length, 6—6.5 mm.

Marion and Putnam counties, Ind., June 5—Sept. 1; in the former swept from its host plant, the jewel-weed or touch-me-not, *Impatiens biflora* Walt., growing along the margins of White River. A palæarctic European species ranging in this country from Quebec and New England west to Michigan, British Columbia and Alaska, and southwest to the mountains of North Carolina. The membrane is sometimes wholly pale with veins green. Easily known by the lack of basal carina of vertex and uniform green color.

786 (1024). *LYGUS APICALIS* Fieber, 1861, 275.

Elongate-oblong, male, more oval, female. Color pale green fading to greenish-yellow, very sparsely clothed with minute yellow hairs; scutellum, clavus and corium often with a few scattered fuscous or

brownish lines or spots; membrane pale translucent with a vague fuscous spot in the apical third of each cell and two or three others behind the cells; tips of cuneus, beak and tarsi fuscous; antennæ reddish-yellow, the apex of 2 and joints 3 and 4 fuscous; legs greenish-yellow, the apical third of hind femora with faint reddish or fuscous rings or blotches; under surface greenish, often with narrow reddish or fuscous lines on sides. Beak reaching first ventral. Joint 1 of antennæ slightly less than two-thirds the length of pronotum, 2 four times the length of 1, 3 one-half the length of 2, one-third longer than 4. Pronotum with calli indistinct, disk behind them finely rugosely minutely punctate. Scutellum minutely transversely strigose. Elytra very finely, thickly and shallowly punctate. Length, 4.8—5.2 mm.

This is the most common Mirid in southern Florida, both on mainland and islands, hibernating beneath boards and other cover and in fall and spring swept from flowers and herbage along roadsides and borders of marshes. At R. P. Park it was frequent in December on weeds along the borders of tomato fields, and in March on herbage along the borders of the everglades. Fully one-fourth of the specimens taken from goldenrod and other flowers in spring are very prettily marked with red, the extremes having four stripes on pronotum, a broad stripe enclosing a yellow spot each side of scutellum, a stripe on sides of ventrals, some lines on front and middle femora and two bars on hind femora of the red hue. It is a cosmopolitan species, ranging in this country from New England southwest in the coast-wise states to Florida and Texas. Recorded also from Missouri, California and the West Indies. Breeds on the horse-weed, *Leptilon canadense* (L.). According to Knight the *L. prasinus* Reut. (1876, 72) was based on green forms of *L. apicalis*, while the American records of the European species, *L. contaminatus* (Fall.) and *L. lucorum* (Meyer), should also be referred to *apicalis*.

787 (1035). *LYGUS PLAGIATUS* Uhler, 1895, 35.

Oblong-oval. Fuscous or greenish-black; head dark greenish-yellow, the vertex often with a median black stripe; pronotum glabrous, greenish-yellow, usually with a dot on each callus, a dot or ray behind it, and the hind margin and posterior angles, blackish, sometimes the whole disk blackish; scutellum either black with two discal spots and tip yellow or yellow with base, two median lines and side margins black; clavus and corium with numerous small yellowish pubescent spots and dots; cuneus yellowish-translucent, the inner basal angles and tip black; membrane with cells black, remainder dusky, veins paler; legs greenish-yellow, femora annulate on apical third with dark rings; tibiæ with spines, a ring near base and tips fuscous; tips of tarsi and beak blackish. Joint 1

of antennæ brownish-black, but little longer than width of vertex; 2 three times as long as 1, greenish-yellow, its extreme base and apical fourth blackish; 3 fuscous, paler at base, nearly twice as long as 1; 4 fuscous, slightly shorter than 3. Pronotum, except calli, coarsely and evenly punctate. Scutellum strongly transversely strigose. Clavus rugosely punctate, corium densely granulate-punctate. Female usually paler than male with second antennal about one-eighth shorter. Length, 5.5—6 mm.

Marion, Vigo and Knox counties, Ind., June 13—Oct. 17; common in autumn on flowers of goldenrod and ragweed, one on the later date beneath a log. Natick, Mass., June 5 (*Frost*). Ranges from Quebec and New England west to Missouri and California. Not recorded in the east south of the District of Columbia. Breeds on the great ragweed, *Ambrosia trifida* L.

788 (1031). *LYGUS PRATENSIS* (Linnæus), 1758, 448.

Oblong-oval. General color dull reddish or brownish-yellow marked with blackish; head glabrous with three or four dark reddish or piceous

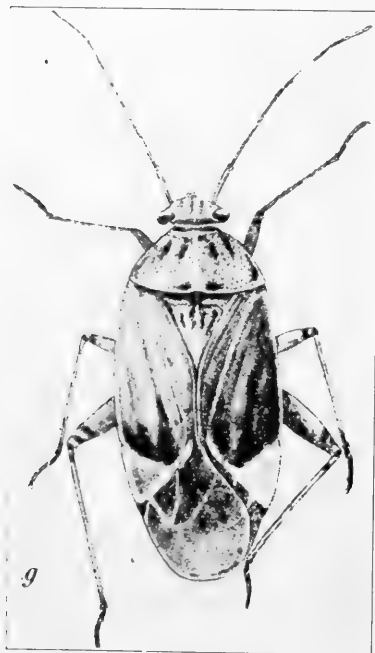


Fig. 171. *Lygus pratensis* L., X 10.
(After Weiss).

stripes; pronotum almost glabrous, the collar, narrow edge of all the margins, median line and two abbreviated stripes each side pale greenish-yellow, a submarginal line and four stripes alternating with the yellow ones, blackish; scutellum blackish with a Y-shaped mark, including apex, yellowish - white; elytra finely pubescent, clavus and corium usually reddish-brown, the former with a fuscous blotch at middle, the latter with apical third more or less fuscous, claval vein and embolium pale yellow; cuneus yellowish - translucent, the inner basal angle and apex reddish; extreme tip piceous; membrane dusky with faint white blotches, cells darker, veins paler; femora reddish-brown, spotted or annulate with paler; tibiæ greenish or reddish-yellow, their tips and a ring near base darker; tips of tarsi and beak piceous; ventrals blackish with a pale stripe along sides. Antennæ blackish, joint 2 usually with a pale ring at basal fourth; joint

1 slightly longer than width of vertex, 2 nearly three times longer than 1, 3 three-fifths the length of 2, one-sixth longer than 4. Disk of pronotum behind calli, coarsely, deeply and unevenly punctate. Clavus rather

coarsely rugose-punctate; corium more finely and densely so. Length, 5—6 mm. (Fig. 174).

This species, known as the "tarnished plant-bug," is in late summer and autumn the most common Mirid throughout Indiana, and in late spring and early summer is exceeded in numbers only by the "meadow plant-bug," *Miris dolabrata* (L.). The adults hibernate beneath rubbish and have been taken on the wing as early as April 2. In summer and fall they occur by hundreds on weeds and grasses along roadsides, borders of fields and all waste places, in late autumn being especially abundant on the white-heath aster, *Aster ericoides* L., in old fallow fields. It is a palæarctic species, ranging over all of Canada and the United States and southward into Mexico. A full account of its life history, food habits, etc., is given by Crosby & Leonard (1914).

A half dozen or more color varieties of *L. pratensis* have been named. The one above described is the *Capsus oblineatus* of Say (1832, 21; I, 340), considered a synonym of *pratensis* by Van Duzee and other authors, but raised to varietal rank by Knight (1917, 564). Three other color varieties which Knight recognizes as occurring in the eastern states he separates by the following key:

KEY TO COLOR VARIETIES OF *LYGUS PRATENSIS* L.

a. Chiefly blackish, but streaked with yellowish; head blackish, but with four longitudinal yellowish marks on front.

788a. var. *STRIGULATUS*.

b. Color chiefly bright red, pronotum with a black spot behind each callus; scutellum pale, middle of base and often a line each side red.

788b. var. *RUBIDUS*.

c. Hemelytra pale, apical area of corium bright red; scutellum yellow, marked with black only at middle of base.

788c. var. *RUBROSIGNATUS*.

788a (—). *LYGUS PRATENSIS STRIGULATUS* Walker, 1873, 94.

Form and size of *pratensis*. Upper surface mainly piceous-black; head with pale lines as in key; yellow lines of pronotum very narrow; scutellum black with two spots and apex yellow; elytra dark reddish-brown and fuscous without pale markings; basal three-fourths of second antennal reddish-brown.

This variety occurs throughout Indiana with the one previously described, but is less common. A specimen from Swannanoa, N. Car., was received from Brimley, and its range in this country is probably the same as that of the typical form.

788b (—). *LYGUS PRATENSIS RUBIDUS* Knight, 1917, 565.

General color as in key; joints 1 and 2 of antennæ red, apex of 2 and all of 3 and 4 fuscous; cuneus margined with red, pale at middle; tibiæ pale reddish-yellow, spines black. Length, 5.5 mm.

Kawishiwi River, Minn., Aug. 28 (*Minn. Univ. Coll.*). Recorded elsewhere only from Maine, New Hampshire and Massachusetts. The variety *rubrosignatus*, as distinguished in key, is known only from Massachusetts.

789 (—). *LYGUS VANDUZEEI* Knight, 1917, 565.

Elongate-oval, large and robust for the genus. Greenish-yellow to reddish-brown; head usually unicolorous, sometimes with red or brown lines; pronotum marked with black as in key, sometimes with two dots behind each callus and rarely with dark stripes on disk; scutellum with tip and an oblique spot each side of basal half yellow, sometimes wholly pale yellow; corium often with a fuscous bar across apical third, the anal ridges yellowish; embolium in great part pale, its entire outer edge blackish; claval vein and cuneus yellowish, the latter with extreme base and tip reddish-brown; membrane pale translucent with a slight dusky tinge, sometimes largely fuscous-brown, veins yellowish or reddish; legs greenish-yellow, more or less tinged or dotted with brownish or reddish, the basal halves of hind femora reddish or blackish; under surface greenish-yellow, the ventrals more or less clouded with reddish or brownish, and usually with a stripe of similar hue along their sides. Joint 1 of antennæ reddish-brown to piceous, one-half the length of pronotum; 2 bright reddish-brown, the apical third piceous, four-fifths as long as basal width of pronotum; 3 and 4 dark brown to fuscous, united slightly longer than 2. Pronotum, except calli, coarsely, sparsely and irregularly punctate. Scutellum transversely rugose. Elytra rather coarsely and closely punctate. Length, 6.5—7.5 mm.

Kenosha, Wis. (*Gerhard*). Linville Falls, Swannanoa and Craggy Mts., N. Car., June to September (*Brimley*). Oliverrea, N. Y., Sept. 10 (*Davis*). The known range is northern, extending from Nova Scotia and New England west to North Dakota and southwest to the mountains of North Carolina. Knight says that in New York it breeds on the Canada goldenrod, *Solidago canadensis* L., the adults hibernating and appearing on the tender goldenrod plants during May. "The eggs are doubtless stuck in the tender stems, where the nymphs appear and feed during July. Most of the adults mature by the middle of August and continue to feed on the host plant until the cool September nights cause them to seek hibernation quarters." A slightly smaller form (6.6 mm.), bright ruby-red in color, the pronotum and antennæ marked with blackish as in typical *vanduzeei*, was named var. *rubroclarus* by Knight (1917, 567).

It occurs in Nova Scotia, Quebec, New England and New York. Part of the North Carolina specimens at hand are intermediate in color between the two forms.

790 (1036). *LYGUS CAMPESTRIS* (Linnæus), 1758, 448.

Oblong-oval. Greenish-brown or brownish-yellow thinly clothed with rather long yellowish prostrate hairs; head dull yellow; apical half of tylus and lower half of cheeks often fuscous; pronotum with a transverse spot behind calli, a round one on basal angles and a sub-basal cross-bar fuscous, these markings often obsolete; elytra dull straw-yellow to fuscous-brown, clavus and inner apical third of corium usually darker; embolium pale yellow, its outer edge darker; cuneus dull yellow, the apex and inner basal angle fuscous; membrane pale translucent with a faint dusky tinge; legs greenish-yellow, the apical third of hind femora vaguely annulate with darker; tibial spines and tips of beak and tarsi piceous. Joint 1 of antennæ yellow or brown, its length less than width of vertex, remaining joints dark brown, 2 three and a third times the length of 1, 3 less than half the length of 2, slightly longer than 4. Pronotum, except calli, finely, closely but distinctly punctate. Scutellum vaguely transversely rugulose. Clavus coarsely, closely punctate, corium more finely and shallowly so. Length, 4—4.2 mm.

Marion and Putnam counties, Ind., May 1—Oct. 6; swept from its host plants, the poison hemlock, *Conium maculatum* L., and other Umbelliferae. Palisades, N. J., and Batavia, N. Y., July—August (*Davis*). A European species, ranging in this country from Newfoundland and New England west to Alaska and the Pacific. Not recorded in the east south of the District of Columbia. Injurious at times to celery. Van Duzee says that near Buffalo, N. Y.: "It is common May to August, on flowers of Umbelliferae. It may frequently be found in winter hibernating beneath loose bark of elm and other trees; the scutellum is then often a bright clear green." The *Orthops scutellatus* Uhler (1877, 420) is a synonym.

Subgenus *NEOLYGUS* Knight, 1917, 561.

The species belonging to this group or subgenus are oblong- or elongate-oval, with the integument or body covering more flimsy or delicate in character than in those preceding; pronotum usually much more finely transversely rugose, often almost indistinctly punctate; scutellum almost always finely transversely strigose without evident punctures. The principal character used by Knight in separating them was, however, that pertaining to the genital claspers of male as set forth in the key, p. 760, and shown in fig. 173, *B*. As the number of

known eastern species in the subgenus is 29, they are, for convenience, separated into three groups.

KEY TO GROUPS OF EASTERN SPECIES OF SUBGENUS NEOLYGUS.

- a. Pronotal disk greenish or yellowish to brownish and (except in males of *tiliæ* and *hirticulus*) without distinct dark spots or rays.
 - b. Color of upper surface chiefly greenish, often fading to greenish-yellow; sometimes darkened on clavus and apical third of corium, but the ground color green. GROUP I, p. 768.
 - bb. Color distinctly yellowish or brownish, more brownish than green. GROUP II, p. 771.
- aa. Pronotal disk blackish or marked with dark rays. GROUP III, p. 778.

GROUP I.—SUBGENUS NEOLYGUS.

KEY TO EASTERN SPECIES OF GROUP I, SUBGENUS NEOLYGUS.

- a. Tibial spines with fuscous spots at base.
 - b. Corium with fuscous spot on inner apical angle; clavus greenish-yellow, more brownish near scutellum and suture. 791. *CONFUSUS*.
 - bb. Corium never infuscated but with dilute bronze on inner half; clavus and basal half of pronotum distinctly bronzed. 792. *ALNI*.
- aa. Tibial spines without fuscous spots at base.
 - c. Upper surface uniformly greenish; extreme inner apical angle of corium with a fuscous mark; basal area of membrane with a transverse fuscous bar; length, 5.2—5.7 mm. 793. *NEGLECTUS*.
 - cc. Upper surface green, but apical third of corium and usually the clavus in part distinctly brownish or reddish-brown, sometimes dark brown or fuscous.
 - d. Apical half of membrane with a median longitudinal line or ray, this often widened apically; inner apical third of corium with a triangular dark brownish spot; clavus usually in part brownish; length, 5.6—6 mm. 794. *BELFRAGII*.
 - dd. Membrane never with longitudinal fuscous ray as above; smaller, length not more than 5.5 mm.
 - e. Second antennal with apical one-fifth or more fuscous; general color pale greenish-yellow or yellowish-brown; clavus and dark spot on apical half of corium brownish-black; femora greenish-yellow, the apical third of hind ones banded with fuscous. 795. *CANADENSIS*.
 - ee. Second antennal never distinctly fuscous near apex.
 - f. Scutellum darkened with fuscous; clavus more or less fuscous; corium with a triangular dark patch before apex; females with dark markings much reduced; length, 4.6—5 mm. 796. *TILIÆ*.
 - ff. Scutellum pale yellow; clavus with inner half dark brown; membrane with apical half pale, but with submarginal fuscous spot each side of middle and a third near tip of cuneus. 797. *INCONSPICUUS*.

791 (—). *LYGUS CONFUSUS* Knight, 1917, 606.

General color greenish-yellow, the basal third of pronotum and sides of scutellum yellowish-brown; inner half of clavus brownish, inner apical angles of corium with a fuscous spot, cuneus translucent; membrane fuscous, veins and basal half of cells paler; legs greenish-yellow, hind femora with minute fuscous dots on lower side and two vague subapical fuscous rings above; fuscous spots at base of tibial spines prominent. Joints 1 and 2 of antennæ greenish-yellow to brownish, 1 two-thirds as long as pronotum, 2 three and one-third times the length of 1; 3 and 4 pale fuscous, 3 slightly more than half the length of 2, one-half longer than 4. Beak reaching first ventral. Length, 4.3—5.3 mm.

Recorded only from Maine, New Hampshire and New York.

792 (—). *LYGUS ALNI* Knight, 1917, 607.

Bright green fading to yellowish, with bronze markings as in key; scutellum dark green with a tinge of bronze; membrane pale brown, apical third of cells and spot near apex of cuneus darker; legs greenish, tips of tibiæ and tarsi yellowish-brown, very small spots at base of tibial spines fuscous; under surface green to yellowish-green. Joints 1 and 2 of antennæ wholly yellowish, 1 twice as long as width of vertex, 2 three and one-fifth times as long as 1; 3 and 4, pale fuscous, 3 one-half as long as 2, 4 three-fourths the length of 3. Beak reaching tips of hind coxæ. Length, 5.5—5.7 mm.

Beaver Bay, Minn., Aug. 20 (*Minn. Univ. Coll.*). Recorded from Nova Scotia, New Hampshire and New York. Breeds on the hoary alder, *Alnus incana* Willd. Reuter's New England records (1909, 42) of the European *L. viridis* (Fall.) were based on specimens of this form. Cabinet specimens fade to pale brownish-yellow and resemble closely those of *L. fagi*.

793 (—). *LYGUS NEGLECTUS* Knight, 1917, 619.

Bright green or yellowish-green; head, calli and under surface yellow; membrane pale hyaline, its base clouded with fuscous; legs greenish-yellow, tibiæ green with dull yellow spines, the hind pair somewhat curved. Joint 1 of antennæ greenish-yellow, male, bright green, female, as long as pronotum; 2 greenish-yellow, brownish at tip, three times as long as 1; 3 and 4 dark brownish, 3 one-half the length of 2, twice as long as 4. Beak reaching middle of hind coxæ. Length, 5.2—5.6 mm.

Recorded from Massachusetts, Alabama and Louisiana. Breeds on the water beech, *Carpinus caroliniana* Walt. Resembles *L. pabulinus* (Linn.), but shorter, broader and with a distinct basal carina on vertex.

794 (1018). *LYGUS BELFRAGII* Reuter, 1876, 71.

Greenish or greenish-yellow, fading in great part to greenish- or pale straw-yellow, thinly clothed with fine prostrate yellowish hairs; head and pronotum unicolorous, or the basal half of latter sometimes lightly

tinged with bronze; scutellum pale greenish-yellow; corium and membrane with fuscous-brown as in key, each cell of latter with a small apical fuscous spot; clavus often with a vague brown blotch along the base of commissure; embolium and cuneus wholly pale translucent yellow; legs and under surface a uniform pale greenish or straw-yellow. Antennæ in great part straw-yellow, very finely pubescent, joints 3 and 4 dusky; joint 1 about two-thirds the length of width of head across eyes; 2 usually fuscous toward apex, three and a third times the length of 1; 3 one-half the length of 2; 4 two-thirds as long as 3. Basal half of vertex with a short median sulcus. Pronotum and scutellum, finely transversely rugose, without visible punctures. Elytra finely and closely punctate. Length, 5.6—6 mm.

Batavia, N. Y., July 31 (*Gerhard*). Known from Ontario and New England west to Pennsylvania. "In western New York it breeds abundantly on mountain maple, *Acer spicatum* Lam., and to some extent on dockmakie, *Viburnum acerifolium* L., and alternate-leaved dogwood, *Cornus alternifolia* L. It is also frequently attracted to the flowers of poison hemlock, *Conium maculatum* L., for feeding, and in this way 58 specimens were taken on July 31." (*Knight*).

795 (—). *LYGUS CANADENSIS* Knight, 1917, 634.

Color as in key, basal third of pronotum and margins of scutellum sometimes brownish; embolium pale yellowish; membrane fuscous, base of cells and small area near tip of cuneus paler; legs and ventrals yellowish to yellowish-brown, tips of tarsi fuscous. Antennæ dull yellow; joint 1 two-thirds as long as pronotum; 2 three times the length of 1; 3 and 4 tinged with fuscous, 3 three-fifths as long as 2, one-half longer than 4. Beak reaching between hind coxæ. Elytra finely and closely punctate. Length, 5.4—5.6 mm.

Recorded from Parry Sound, Ontario; New York, New Jersey and Wisconsin. A color variety, having a blackish ray behind each callus, was named *binotatus* by Knight.

796 (—). *LYGUS TILLÆ* Knight, 1917, 613.

Greenish-yellow, rather thickly pubescent with appressed yellowish hairs. Male with basal portion of pronotum, scutellum and clavus almost wholly, and inner half of apical third of corium, dark fuscous-brown; female with pronotum wholly pale, dark markings of scutellum and clavus usually vague and dark blotch of corium paler and reduced in size; embolium and cuneus yellowish-translucent; membrane with base and cells dusky, paler toward apex; legs and under surface greenish-yellow, ventrals of male with a dusky tinge. Joints 1 and 2 of antennæ greenish-yellow; 1 three-fifths the length of pronotum; 2 slightly more than three times the length of 1; 3 dusky toward apex, more than half the length of 2; 4 wholly fuscous, two-thirds the length of 3. Basal half of vertex with a short median groove. Sculpture of pronotum, scutellum and elytra as in *belfragii*. Length, 4.6—5 mm.

Portage, N. Y., June 27 (*Davis and Gerhard*). The known range extends from Ontario and New England west to southern Michigan. Knight states that it breeds abundantly on the linden, *Tilia americana* L., the young hatching with the unfolding of the leaves and maturing in late June. The females deposit their eggs in the twigs during July and disappear by the end of that month. Adults are frequently attracted to the flowers of the smooth sumac, *Rhus glabra* L. It probably occurs in those parts of Indiana where the linden grows. A variety *heterophyllus*, uniform pale green in hue, the female with shorter beak, has been named by Knight (1918c, 44). It is known from Georgia and Mississippi, where it occurs on the silver-leaf linden, *Tilia heterophylla* Vent.

797 (—). *LYGUS INCONSPICUUS* Knight, 1917, 612.

Pale green, fading to greenish-yellow, thinly clothed with fine yellowish pubescence; clavus with a vague pale brownish to fuscous blotch along its inner half, this reaching only to base of commissure; inner apical third of corium in great part fuscous or brownish, this hue sometimes extending to outer margin of embolium, thus forming a more or less complete dark cross-bar; membrane pale translucent, tips of cells and two spots behind them pale fuscous; legs green, spines of tibiæ and tips of tarsi and beak brownish. Joint 1 of antennæ green, one-third longer than width of vertex; 2 green, dusky near tip, its length equal to width of base of pronotum; 3 and 4 fuscous, 4 about two-thirds the length of 3. Head very short, face nearly vertical. Beak reaching first ventral. Pronotum minutely rugosely shallowly punctate; calli scarcely evident. Elytra finely scabrous. Length, 4.5—5.2 mm.

Marion, Putnam and Orange counties, Ind., May 30—June 3; swept from herbage in dense woodlands (*W. S. B.*). Willow Springs, Ill., July 3 (*Gerhard*). The known range extends from Connecticut west to Indiana and southwest to Georgia. Breeds on wild grape.

GROUP II.—SUBGENUS NEOLYGUS.

KEY TO EASTERN SPECIES OF GROUP II, SUBGENUS NEOLYGUS.

- a. Beak scarcely reaching tips of middle coxæ; color rich yellowish-brown, slightly darker on clavus and apically on corium.
- b. Second antennal yellowish, infuscated at apex, its length greater than width of pronotum at base. 798. *VIBURNI*.
- bb. Second antennal not fuscous at apex, its length less than width of pronotum at base. 799. *NYSSÆ*.
- aa. Beak reaching beyond tips of middle coxæ.
- c. Tylus with apical half black; two bands on apical third of hind femora, sides of body and head in part, reddish.

800. *ATRITYLUS*.

- cc. Tylus not black, or if so, then body and bands on femora not reddish.
- d. Hind femora not distinctly biannulated with dark and pale near apex; second antennal rarely fuscous near tip, if so the annuli on femora indistinct.
- e. Scutellum infuscated and with a pale median line on apical half; upper surface dark greenish-brown to blackish; ventral surface with a lateral dark fuscous stripe its full length; femora dark, the knees paler. 801. INVITUS.
- ee. Scutellum sometimes dark, but without pale median line.
- f. Elytra either uniformly reddish-brown, rich brown or fulvous, or pale brown flecked with yellowish.
- g. Joint 3 of antennæ more than one-half the length of 2; color above and beneath not pale brown flecked with yellowish.
- h. Elytra and femora yellowish-bronzed in both sexes; membrane distinctly infuscated. 802. FAGI.
- hh. Elytra and femora brownish-yellow to blackish, male, uniformly rich brownish, female; membrane of female a uniform yellowish, of male, usually infuscated. 803. HIRTICULUS.
- gg. Joint 3 of antennæ only one-fourth the length of 2; color above and beneath pale brown flecked with pale yellow. 804. IRRORATUS.
- ff. Elytra not colored as in *f*, the clavus in part and apical half of corium darker than scutellum and basal half of corium.
- i. Second antennal fuscous toward apex; clavus and apical fourth or more of corium dark brownish; embolium, outer basal half of corium and cuneus pale translucent; length, 6—6.5 mm. 805. OSTRYÆ.
- ii. Second antennal uniformly colored, never fuscous toward apex.
- j. Length of second antennal scarcely exceeding width of pronotum at base; beak scarcely reaching tips of hind coxæ; elytra yellowish-brown to greenish-yellow, an apical spot on corium, inner margin of clavus and commissure dark brown to blackish. 806. CLAVIGENITALIS.
- jj. Length of second antennal much exceeding width of pronotum at base; beak reaching onto first ventral; clavus and corium in part dark brownish. 807. GENESENSIS.
- dd. Hind femora distinctly biannulated with dark and pale near apex; second antennal fuscous toward apex.
- k. Femora and usually the sides of under surface, distinctly reddish; apical third of hind femora annulated with pale and dark reddish; pronotal disk rarely wholly blackish. 808. QUERCALBÆ.
- kk. Femora and sides of under surface dark brown to fuscous; apical third of hind femora annulate with dark fuscous. 809. OMNIVAGUS.

798 (—). *LYGUS VIBURNI* Knight, 1917, 609.

Brownish-yellow, thinly clothed with short fine prostrate yellow hairs; entire clavus and apical third of corium a darker brown; sides of pronotum, entire scutellum, cuneus and basal two-thirds of embolium,

pale yellowish; membrane fuscous-brown, the veins scarcely paler; legs pale brownish-yellow, the apical third of femora with two darker rings, tips of beak and tarsi piceous-brown; under surface straw-yellow, the genital segment and a stripe on sides of ventrals dark brown, male, wholly pale with ventrals only tinged with darker, female. Joint 1 of antennæ yellowish, three-fifths as long as pronotum; 2 as in key, three and a half times longer than 1; 3 and 4 fuscous-brown, 3 half the length of 2, 4 two-thirds as long as 3. Pronotum, except the inconspicuous calli, finely, shallowly, rugosely punctate. Scutellum minutely transversely strigose. Clavus and corium finely scabrous or granulate-punctate. Length, 5.2—5.8 mm.

Batavia, N. Y., June 15—20 (*Gerhard and Davis*). Recorded only from Vermont, Connecticut and New York. "Breeds on the nanny-berry, *Viburnum lentago* L., the adults being most common on the old plants. The nymphs hatch with the unfolding of the leaves and continue to feed on the tender foliage. Close to *genesensis*; differs in male claspers, in being more robust, in shorter beak, in apical half of second antennal being infuscated and having in general a richer yellowish-brown color." (*Knight*).

799 (—). *LYGUS NYSSÆ* Knight, 1918c, 43.

Pronotum and scutellum yellowish-brown; clavus and apical half of corium darker brown, thickly clothed with yellowish pubescence; embolium and narrow outer margin of corium pale yellowish; membrane fuscous, paler near cuneus, veins brownish; legs a nearly uniform straw-yellow, femora often tinged with reddish; ventrals yellowish, sides and genital region slightly darker. Joints 1 and 2 of antennæ yellowish, 1 one-half as long as pronotum, 2 three times the length of 1; 3 and 4 fuscous-brown, 3 slightly more than one-half as long as 2, twice as long as 4. Length, 5.4—5.6 mm.

Lyme, Conn., June 16 (*Walden*). Recorded only from that State and Alabama. Breeds on sour gum, *Nyssa aquatica* L.

800 (—). *LYGUS ATRITYLUS* Knight, 1917, 606.

Greenish-yellow to brownish, thinly clothed with very fine prostrate yellowish hairs; head pale brownish-yellow, shining, flecked with reddish spots and dashes; pronotum, scutellum and elytra greenish or pale brownish-yellow, more or less tinged or spotted with reddish, inner half of clavus and apical fourth of corium often in part pale fuscous; embolium, cuneus and outer half of corium pale translucent; membrane tinged with dusky, often with a blackish inverted Y at base, usually with pale sub-marginal spots at middle; legs and under surface greenish-yellow, femora flecked with reddish spots, tibial spines arising from fuscous spots as in *L. alni*; sides of ventrals with a reddish stripe. Joints 1 and 2 of antennæ pale brownish-yellow, joint 1 nearly one-third longer than width of vertex, 2 three and a third times longer than 1; 3 and 4 in great part

fuscous, 3 almost three-fifths the length of 2, 4 two-thirds as long as 3. Beak reaching base of first ventral. Pronotum and elytra minutely indistinctly punctate. Length, 5.2—5.4 mm.

Wanakena, N. Y., July 15 (*Gerhard*). Known from New England, New York and Colorado. Drake (1923, 74) records it as very common on willow in moist shady situations in the Cranberry Lake region of New York.

801 (1020). *LYGUS INVITUS* (Say), 1832, 24; I, 345.

Dark greenish or reddish-brown to blackish, thinly clothed with fine prostrate yellow hairs; pronotum often with sides more or less fuscous-brown, disk with a greenish-yellow median line, this sometimes entire, more distinct in the darker males; clavus and apical two-thirds of corium usually darker than pronotum; basal half of embolium and entire cuneus pale translucent yellow; membrane fuscous with ill defined paler spots toward apex; legs greenish-yellow, the apical half or more of hind femora darker; tips of tarsi and beak piceous; under surface dull greenish-yellow, the sides with a broad fuscous stripe reaching from hind margin of propleura to genital plate. Joints 1 and 2 of antennæ greenish or brownish-yellow, 2 tinged with dusky toward apex, more than three times the length of 1; 3 and 4 wholly fuscous, united equal in length to 2, 4 three-fifths the length of 3. Pronotum with calli evident, but not prominent, smooth, shining, disk behind them finely strigose with minute punctures between the strigæ. Elytra scabrous and very finely punctate. Length, 5—5.7 mm.

Marion Co., Ind., June 4—30, swept from foliage of poison ivy and elm. Described by Say from Indiana. Its recorded range extends from Quebec and New England west to North Dakota and southwest to Kansas and New Mexico, but some of the western records are doubtless to be referred to other species. Knight states that *invitus* breeds mainly on elm, preferring always the young thrifty plants with succulent shoots. The nymphs are pale greenish, hatching soon after the leaves appear in spring from eggs that were inserted in the twigs the previous July. The adults all disappear by the first of August.

802 (—). *LYGUS FAGI* Knight, 1917, 603.

Color a nearly uniform pale brownish-yellow, strongly shining, thinly clothed with fine prostrate yellowish hairs; clavus a slightly darker shade of pale brown; entire corium and cuneus a pale translucent yellow; membrane with a dusky tinge, the veins paler; tips of beak and tarsi fuscous. Beak reaching base of first ventral. Antennæ pale yellowish-brown, the apical joints faintly tinged with fuscous; joint 1 as long as head, 2 three times as long as 1, 3 three-fifths the length of 2, 4 two-thirds as long as 3. Pronotum, except calli, finely closely but distinctly

punctate; calli small, scarcely evident. Scutellum finely transversely rugose. Elytra scabrous or minutely strigose-punctate. Length, 4.6—4.8 mm.

Steuben County, Ind., June 15; swept from herbage in a tamarack swamp (*W. S. B.*). Rock City, N. Y., July 4 (*Davis* and *Gerhard*). Ashland, Mass., May 2 (*Frost*). Known heretofore only from New England and New York. Breeds on beech and yellow birch, *Betula lutea* Michx. It is said to prefer cool shady locations, the eggs hatching in early spring, the adults maturing in late June and disappearing by Aug. 1. This species resembles *hirticulus* closely, but is somewhat smaller, with general color paler, the male no darker than the female and membrane more uniformly dusky.

803 (1019). *LYGUS HIRTICULUS* Van Duzee, 1916, 41.

Head and pronotum usually uniformly dull greenish-yellow or pale reddish-brown, in some males in part or almost wholly fuscous-black; elytra and membrane as in key, cuneus pale translucent to brownish; legs greenish-yellow or pale straw-yellow; under surface of the same hue, the sides often with a vague reddish stripe. Antennæ greenish-yellow, faintly tinged with dusky toward apex, joint 1 two-thirds the length of pronotum, 2 three and a half times the length of 1, 3 and 4 united slightly shorter than 2, 4 two-thirds the length of 3. Pronotum with disk, except calli, finely rugose-punctate. Scutellum and clavus finely transversely strigose. Corium minutely scabrous. Length, 4.8—5.5 mm. (Fig. 186, *b*).

Marion Co., Ind., May 31—July 14; beaten from foliage of maple. Ranges from Maine and Massachusetts west to Michigan and Indiana. Recorded also by Van Duzee from Crescent City and Sevenoaks, Fla. Knight has reared specimens from chestnut, beech and woodbine.

804 (—). *LYGUS IRRORATUS* sp. nov.

Elongate-oval. Pale brown, flecked above with numerous scattered spots of pale yellow, more thickly beneath with smaller spots of the same hue, the pale spots less evident on clavus and corium than on other parts above; membrane pale hyaline, veins yellowish; legs pale yellow, both femora and tibiæ vaguely marked with small brown spots. Joint 1 of antennæ yellow with three or four reddish-brown dots, three-fourths as long as width of vertex; 2 dull yellow, four and a half times as long as 1; 3 and 4 dusky, 3 one-fourth the length of 2, 4 two-thirds as long as 3. Upper surface thinly clothed with fine inclined yellowish hairs. Beak reaching hind coxæ. Pronotum twice as wide at base as at apex, hind portion rather strongly convex, thickly and finely transversely strigose with minute punctures between the strigæ; hind margin broadly rounded. Scutellum similarly strigose. Clavus and corium finely and shallowly rugose-punctate. Length, 3.8 mm.

R. P. Park, Fla., March 17; one female swept from roadside herbage. Differs from all our other species in the peculiar mottling of both upper and lower surfaces and in the short third and fourth antennals.

805 (—). *LYGUS OSTRYÆ* Knight, 1917, 635.

Pale brownish-yellow, thinly clothed with fine prostrate yellowish hairs; clavus and a bar across apical fourth of corium a darker brown; membrane with base and cells in great part fuscous, apical portion dusky; legs and under surface greenish-yellow, a stripe on sides of ventrals, tips of beak and tarsi and sometimes two bands on apical third of hind femora, darker. Antennæ very slender, joint 1 and basal two-thirds of 2 pale straw-yellow, apical third of 2 fuscous, 3 and 4 dusky yellow; 1 three-fourths as long as width of head across eyes, 2 three times as long as 1, 3 nearly one-half the length of 2, 4 three-fifths the length of 3. Pronotum and scutellum finely transversely rugose, the former with the punctures between the rugæ scarcely evident. Elytra finely scabrous. Males with two unusually large upturned prongs of the left genital clasper. Length, 6—6.5 mm.

Parry Sound, Ontario, and Portage, N. Y., June 27—Aug. 7. (*Davis and Gerhard*). Known only from Ontario, New England and New York. Breeds on the hop hornbeam, *Ostrya virginiana* (Mill.).

806 (—). *LYGUS CLAVIGENITALIS* Knight, 1917, 632.

Pronotum yellowish-brown, paler on sides; scutellum yellowish, the margins brownish; color of elytra as in key; embolium and cuneus pale yellowish translucent, more or less tinged with green; membrane fuscous-brown, veins and a vague spot near tip of cuneus paler; legs and under surface yellowish or greenish, hind femora often tinged with brown. Joint 1 of antennæ straw-yellow, one-third as long as width of base of pronotum; 2 yellowish-brown, as long as pronotum; 3 and 4 pale fuscous, 3 nearly two-thirds as long as 2, 4 two-thirds the length of 3. Vertex with basal carina prominent. Pronotum shallowly and finely punctate. Length, 4.8—5.1 mm.

Litchfield, Conn., July 22 (*Walden*). Recorded only from New England and Maryland. Occurs at times on *Alnus rugosa* (DuRoi). "The females are likely to be confused with those of *tiliæ* and *inconspicuus*, but *tiliæ* is more green, particularly the pronotum, and the scutellum is darkened with fuscous; *inconspicuus* is more greenish with fuscous marks on clavus and apex of corium more in contrast." (*Knight*).

807 (—). *LYGUS GENESEENSIS* Knight, 1917, 609.

Dull greenish to straw-yellow, thickly clothed with conspicuous subprostrate yellowish pubescence; clavus and inner half of corium dark brownish, outer half of corium greenish-yellow tinged with brownish;

embolium and cuneus pale translucent yellow; membrane dusky translucent, with some vague spots across the middle darker; legs pale straw-yellow; under surface pale brown. Joints 1 and 2 of antennæ wholly yellowish, 3 and 4 tinged with fuscous; 1 nearly three-fourths as long as width of head across eyes, 2 three times as long as 1, 3 three-fifths as long as 2, 4 three-fifths the length of 3. Pronotum relatively short and wide, nearly twice as wide at base as long, finely rugose-punctate. Elytra finely scabrous. Length, 5 mm.

Portage, N. Y., June 22 (*Gerhard*). Long Island, N. Y., June 27 (*Davis*). Ranges from Massachusetts west to Missouri. Breeds on white oak, *Quercus alba* Linn.

808 (—). *LYGUS QUERCALBÆ* Knight, 1917, 624.

Pale reddish-brown or brownish-yellow thinly clothed with prostrate yellowish hairs; head usually with a series of oblique transverse reddish lines each side of front and vertex; calli and basal half of pronotal disk often more or less tinged with fuscous; scutellum pale straw-yellow, the sides slightly darker; clavus and apical half of corium dark brown, the brown of the latter often forming a bar reaching across the embolium, this sometimes with outer portion reddish; cuneus pale translucent, the tips often reddish; membrane pale fuscous, paler on middle of sides, veins yellowish or reddish; legs pale yellow, femora marked with reddish, hind ones with apical two-thirds in great part reddish to fuscous; ventrals greenish-yellow with a pale stripe on sides bounded within by fuscous, without by reddish. Antennæ with joint 1 and basal two-thirds of 2 straw-yellow, apical third of 2 and all of 3 and 4 tinged with fuscous; 1 two-thirds as long as width of head across eyes, 2 three times the length of 1, 3 nearly half the length of 2, 4 half as long as 3. Pronotum finely closely and shallowly rugose-punctate. Elytra finely scabrous. Length, 5.7—6.2 mm.

Lake and Marion counties, Ind., May 24—Aug. 14; beaten from white oak (*W. S. B.*). Glen Ellyn and Willow Springs, Ill., May 30—June 10 (*Gerhard*). Pine Island, N. Y., June 19 (*Davis*). The known range extends from Massachusetts and Connecticut west to Wisconsin and south to Virginia. Breeds on white oak, usually in some abundance, and its distribution is probably much more extensive than at present recorded. Knight states that in New York the nymphs hatch with the bursting of the oak buds, and feed thereafter on the tender foliage. The adults mature in early June and deposit their eggs in the twigs of the host plant, where they remain over winter.

809 (—). *LYGUS OMNIVAGUS* Knight, 1917, 627.

Very similar in form, size and color to *quercalbæ*. Differs in lacking the red markings of head, embolium, legs and under surface; membrane pale hyaline, apical half of cells, and three spots toward apex fuscous; hind femora with apical third fuscous-brown; ventrals with a vague

dark brown stripe along sides and with pale pubescence prominent. Joints 3 and 4 of antennæ each about one-fourth longer than in *quercal bæ*, 3 being more than half the length of 2, and 4 three-fifths as long as 3. "Genital claspers of male very distinctive, the broad upcurved sinistral clasper extending beyond the tip of body and easily seen without a lens." Length, 5.5—6 mm.

Dunedin, Fla., March 18—April 27, adults and nymphs beaten from wild cherry; the first record for the State (*W. S. B.*). Long Island, N. Y., June 26 (*Davis*). Glen Ellyn, Ill., June 19; Pentwater, Mich., July 14 (*Gerhard*). Ranges from Ontario and New England west to Michigan and Illinois and southwest to North Carolina and Florida. Breeds on several species of oak, also on dogwood, chestnut and maple-leaved arrow-wood. Of the female of *omnivagus* Knight says: "Usually paler than the male, more yellowish-brown; never with reddish as in *quercal bæ*, nor with fuscous marks on the pronotum as in *semivittatus* or in *caryæ* var. *subfuscus*; very similar to *canadensis*, but that species has the apical one-third of antennal segment ii more distinctly black, the fuscous spot on apex of corium smaller and not invading the pale embolium."

GROUP III.—SUBGENUS NEOLYGUS.

KEY TO EASTERN SPECIES OF GROUP III, SUBGENUS NEOLYGUS.

- a. Disk of pronotum blackish, rarely with distinct rays; hind femora blackish with pale rings near apex; elytra, except cuneus, blackish, the costal margin scarcely paler; cuneus pale translucent, its apex fuscous. 810. *CARYÆ*.
- aa. Disk of pronotum with distinct dark rays or spots behind the calli.
- b. Hind femora with two blackish or pale rings on apical third.
- c. Joints 1 and 2 of antennæ black; embolium, outer half of corium and cuneus pale translucent. 811. *JOHNSONI*.
- cc. Joint 1 of antennæ pale or only slightly brownish; apical portion of embolium and outer half of corium usually darkened, if not, then joint 1 of antennæ distinctly pale.
- d. Sides of body, and usually the hind femora, distinctly reddish. 812. *COMMUNIS*.
- dd. Sides of body and femora not reddish.
- e. First and second antennals yellowish; clavus, apical half of corium and embolium blackish. 813. *PARROTTI*.
- ee. Second antennal distinctly fuscous toward apex; head and legs usually slightly tinged with reddish; calli and a widening ray behind each callus blackish. 814. *PARSHLEYI*.
- bb. Hind femora with apical half brownish to black but without distinct rings, the apex or knees only pale.
- f. Scutellum greenish-yellow with median line fuscous or reddish; apex and inner margins of cuneus, femora and more or less of sides of ventrals reddish. 815. *UNIVITTATUS*.

ff. Scutellum without a darker median line.

g. Disk of pronotum with a small fuscous mark behind each callus; ventrals fuscous-brown, a lateral pale stripe dividing the dark color. 816. SEMIVITTATUS.

gg. Disk of pronotum with a distinct black ray or spot behind each callus; sides of ventrals without a pale stripe.

h. Disk of pronotum with a black stripe covering outer half of each callus and extending back to basal margin; general color pale yellowish, clavus, apical fourth of corium and embolium black. 817. VITTICOLLIS.

hh. Disk of pronotum with the black stripes behind the calli not reaching basal margin.

i. Pronotal disk with a conspicuous nearly square black spot behind each callus; ground color yellowish-brown, hind femora except tips, blackish. 818. ATRINOTATUS.

ii. Pronotal disk with a conspicuous black stripe behind each callus, this broadening toward base; ground color yellowish-brown with fuscous more or less tinged with pinkish; hind femora reddish-brown with vague pale rings near tips.

819. LAUREÆ.

810 (—). *LYGUS CARYÆ* Knight, 1917, 615.

Male—Elongate-oblong, sides subparallel. Color above, except head, cuneus and membrane, a nearly uniform fuscous-black, rather thickly clothed with prostrate yellow hairs; head dull yellow with fuscous markings; basal angles of scutellum, embolium and sometimes a vague stripe along corium, yellowish heavily tinged with dusky; cuneus pale yellowish, its tip and inner basal angle fuscous; membrane dark fuscous; veins slightly paler; legs greenish-yellow, the apical halves of hind femora fuscous-brown, middle femora with two vague subapical dark rings; tip of beak and tarsi and spines of tibiæ fuscous. *Female*—Larger and more oval. Dark fuscous-brown; head, pronotum except calli, middle of scutellum, embolium and basal half of corium in great part, dull yellow; cuneus, membrane and legs as in male; under surface dull yellow with a broad fuscous stripe along the sides. Joints 1 and 2 of antennæ fuscous-brown, the incisures pale; 1 two-thirds as long as width of head across eyes; 2 three times as long as 1; 3 and 4 dusky yellow, 3 one-half the length of 2, 4 two-thirds as long as 3. Pronotum finely and closely rugose-punctate. Elytra finely scabrous or granulate-punctate. Length, 5—5.8 mm.

Marion and Posey counties, Ind., May 11—June 19; beaten from hickory (*W. S. B.*). Conesus Lake, N. Y., and Glen Ellyn, Ill., June (*Gerhard*). Staten Island, N. Y., June 6 (*Davis*). The known range extends from New England and New York west to Wisconsin and southwest to Mississippi. Breeds on hickory, walnut and pecan. A var. *subfuscus* Knight has the scutellum, basal half of corium and embolium paler. Specimens of this, taken on pecan May 11, at Millbrook, N. Car., were received from Brimley.

811 (—). *LYGUS JOHNSONI* Knight, 1917, 629.

Elongate, subparallel, male, more oval, female. Dull greenish-yellow, sparsely clothed with short prostrate yellowish hairs; tylus black, its base and cheeks brownish; basal half of calli and a short broad ray behind them, inner half of clavus, claval suture and an elongate wedge along middle of corium, fuscous-brown; membrane with cells fuscous, the base and apical half paler; legs greenish-yellow; under surface greenish-yellow, its sides with a broad black stripe their full length; apical halves of tarsi and tip of beak blackish. Joints 1 and 2 of antennæ black, the former often paler at base, 3 and 4 pale fuscous; 1 slightly more than two-thirds as long as width of head across eyes, 2 three times the length of 1, 3 three-fifths as long as 2, 4 two-thirds the length of 3. Pronotum, except calli, and scutellum finely transversely rugose, the former with punctures scarcely evident. Elytra finely and evenly scabrous. Length, 5.7—6 mm.

Marshall Co., Ind., June 25 (*W. S. B.*). McLean and Ithaca, N. Y., June 20—July 27 (*Davis and Gerhard*). Recorded only from Vermont, Connecticut and New York. Knight found it breeding in New York on the hornbeam or water beech, *Carpinus caroliniana* Walt., the eggs being deposited in late July in the soft punky stubs of old dead limbs.

812 (1020½). *LYGUS COMMUNIS* Knight, 1916, 346.

Pale brownish- or dull greenish-yellow with darker brown or fuscous markings, thinly clothed with fine appressed grayish hairs; apical half of tylus brown, front of head more or less reddish; pronotum with a blackish stripe beginning at the outer margin of each callus, prolonged backward and gradually evanescent before reaching hind margin, the disk between the stripes usually tinged with fuscous; apical fourth of corium with an ill defined dark brown to fuscous bar crossing tip of embolium; cuneus yellowish-translucent; membrane with basal half fuscous, apical half dusky with a large pale submarginal spot enclosing a dusky one; legs brownish-yellow, more or less tinged with reddish, the apical third of hind femora reddish with two vague pale rings; under surface greenish-yellow, the sides with a broad reddish stripe extending their full length, and in male covering the genital plate. Antennæ with basal joint brownish-yellow, remainder darker brown to fuscous; joint 1 one-third longer than width of vertex, 2 three and one-half times the length of 1, 3 one-half as long as 2, 4 slightly longer than 3. Vertex without impressed line near base. Pronotum with calli prominent, disk transversely rugose, its punctures fine, indistinct. Elytra finely scabrous. Male genitalia as in fig. 173, *B*. Length, 5.5—5.8 mm.

Batavia, N. Y., August (*Gerhard*). Known as the "false tarnished plant bug." Ranges from New England west to Michigan, Colorado and British Columbia, and south to Virginia. Breeds on cultivated pear, often doing much damage to

both foliage and fruit; also on dogwood, and occurs on prickly ash.⁸² A pale slender form, which preys upon apples in Nova Scotia, Knight (1916, 349) named var. *novascotiensis*.

813 (—). *LYGUS PARROTTI* Knight, 1919, 21.

General color yellowish to brownish; pronotum with a fuscous-brown ray behind each callus; elytra with dark markings as in key, cuneus yellowish-hyaline; membrane fuscous, veins and basal half of cells paler; legs dull yellow, apical half of hind femora fuscous with two pale rings; ventrals yellowish, sides and genital region fuscous. Joints 1 and 2 of antennæ straw-yellow, 1 two-thirds as long as pronotum, 2 three and one-third times longer than 1; 3 and 4 pale fuscous, 3 nearly three-fifths the length of 2, 4 as long as 1. Beak reaching base of hind coxæ. Length, 5.1 mm.

Recorded only from Geneva, N. Y., where it breeds on *Viburnum*.

814 (—). *LYGUS PARSHLEYI* Knight, 1917, 611.

General color yellowish-brown; head with cheeks, loræ and apical half of tylus darker; pronotum with dark markings as in key, the rays behind calli sometimes merging on base, leaving only the center of disk pale; scutellum darker on sides; clavus and apical two-thirds of corium and embolium dark brown; cuneus pale yellowish-translucent; membrane pale fuscous, sides of veins, basal half of cells and spot near tip of cuneus pale; legs as in *communis*; ventrals dull yellow, sides and genital area dark brown. Joints 1 and 2 of antennæ yellowish-brown, apex of 2 blackish; 1 one-third longer than width of vertex, 2 nearly three times longer than 1; 3 and 4 fuscous, 3 three-fifths the length of 2, 4 nearly three-fourths as long as 3. Beak reaching between hind coxæ. Length, 4.8—5 mm.

The typical form is recorded only from Maine and New Hampshire. Examples of a var. *shermani* Knight, taken at Highlands, N. Car., July 6, were received from Brimley. It is known only from that State, is more brownish than black, with dark rays on pronotum; second antennal shorter, wholly dark brown to blackish or with basal half pale. Length, 5.6—6 mm.

815 (—). *LYGUS UNIVITTATUS* Knight, 1917, 623.

Dull greenish- or brownish-yellow, more or less marked with reddish and fuscous, sparsely clothed with yellow pubescence; head greenish-yellow flecked with numerous reddish points or dots; pronotum with blackish rays evanescent behind; elytra greenish-yellow, tinged with reddish, clavus along the commissure and apical third of corium dark brown to fuscous, embolium greenish-yellow tinged with reddish; membrane with cells fuscous, veins pale, apical half dusky; legs greenish-yellow, femora heavily tinged with reddish-fuscous, tibiæ more lightly

⁸²For a full account of its life history and destructive habits see Bull. 368, Geneva, N. Y. Agr. Exp. Station, 363—384.

so; beak with reddish lines, its tip and apical half of tarsi fuscous; under surface in great part reddish-fuscous, the median portion greenish-yellow. Joint 1 of antennæ blackish- or reddish-brown, paler at base, slightly longer than width of vertex; 2 reddish-brown, darker at base and apex, three and one-fifth times longer than 1; 3 and 4 fuscous, 3 three-fifths the length of 2, one-third longer than 4. Beak reaching second ventral. Pronotum finely rugose with minute punctures between the rugæ. Elytra finely and densely granulate-punctate. Length 5.5—5.8 mm.

Ithaca, N. Y., June 25 (*Gerhard*). Recorded only from that State. Breeds on the red haw (*Crataegus*). "Resembles *lauræ* in coloration, but smaller; similar in size to large forms of *quercalbe* but darker colored and with more reddish." (*Knight*).

816 (—). *LYGUS SEMIVITTATUS* Knight, 1917, 626.

Elongate-oval. Head and pronotum yellowish-brown, apex of tylus and spot behind each callus fuscous; scutellum with sides darker than disk; elytra dark brown to fuscous, basal half of embolium and outer adjacent half of corium yellowish, cuneus pale yellowish; membrane fuscous, the veins and central area paler; legs greenish-yellow, hind femora brown with traces of darker rings near apex. Antennæ yellowish-brown, tinged with fuscous apically, joint 1 two-fifths as long as pronotum, 2 three and one-fourth times longer than 1, 3 nearly three-fifths as long as 2, twice the length of 4. Length 5.3—5.5 mm.

Recorded from New York and Virginia. Breeds on white oak.

817 (1021). *LYGUS VITICOLLIS* Reuter, 1876, 71.

Elongate, subparallel. Dull straw-yellow, sparsely pubescent with very fine appressed yellow hairs; pronotum with blackish stripes as in key; corium with a piceous spot on apex, this usually prolonged obliquely forward to cover apical third of embolium, cuneus pale translucent yellow; membrane in great part fuscous; legs straw-yellow, the apical half of hind femora dark brown. Antennæ dull yellow, the tip of joint 2, apical half of 3 and all of 4, fuscous; joint 1 two-thirds the length of pronotum, 2 slightly more than three times the length of 1, 3 three-fifths the length of 2, nearly twice as long as 4. Pronotum, except calli, very finely strigose. Elytra finely scabrous. Length, 5.8—6.2 mm.

Marion and Putnam counties, Ind., May 19—July 21; beaten from red haw (*Crataegus*) and maple. The recorded range extends from Ontario and New England west to Iowa, and southwest to Texas, the types being labeled from the latter State. Breeds on maple, passing the winter in the egg stage on the host plant. The nymphs are pale whitish in hue, as are also the adults when freshly emerged.

818 (—). *LYGUS ATRINOTATUS* Knight, 1917, 617.

Elongate-oval. Color as in key; scutellum pale yellowish, side margins narrowly black; clavus black with narrow percurrent yellowish

line, corium with apical half blackish, inner margin of basal half often brownish, embolium yellowish, apical third blackish, cuneus pale yellowish-translucent; membrane dark fuscous, basal half of cells, sides of veins and spot near cuneus paler; legs greenish-yellow, hind femora in part blackish; ventrals brownish-yellow, with narrow blackish line on sides. Joint 1 of antennæ yellowish-brown, two-thirds as long as pronotum; 2 black, narrowly pale at base, three times as long as 1; 3 and 4 blackish, 3 about three-fifths as long as 2, 4 two-thirds the length of 3. Beak reaching hind margins of middle coxæ. Length 4.7—5.5 mm.

Recorded from Pennsylvania, District of Columbia and North Carolina.

819 (—). *LYGUS LAUREÆ* Knight, 1917, 636.

Elongate-oval. Dull brownish- or greenish-yellow, thinly clothed with yellowish pubescence; head brownish-yellow, usually with reddish lines or dots, the vertex often with two short dark stripes; pronotum with blackish stripes as in key; elytra usually with inner half of clavus and apical third of corium blackish-fuscous, cuneus and basal two-thirds of corium and embolium greenish-yellow; membrane with base and cells fuscous, veins paler, apical half dusky with a pale spot each side; legs greenish-yellow more or less reddish at base, hind femora as in key; under surface fuscous-brown, the sides usually tinged with reddish, especially so in female. Joint 1 of antennæ brownish-yellow, its length two-thirds the width of head across eyes; 2 blackish, paler at extreme base, three times as long as 1; 3 and 4 fuscous, 3 three-fifths as long as 2, 4 three-fifths the length of 3. Disk of pronotum, except calli, finely transversely rugose with minute punctures between the rugæ; elytra finely, densely shallowly punctate. Length 5.7—6.5 mm.

Rock City, N. Y., July 4 (*Gerhard*). West Point, N. Y., June 15 (*Davis*). Black Mts. and Swannanoa, N. Car., July (*Brimley*). The known range extends from New York southwest to North Carolina. Breeds on mountain laurel, *Kalmia latifolia* L. Of it Knight says: "The eggs are doubtless deposited in the twigs of laurel during July and hatch in the following spring with the unfolding of the leaves. This most unusual and interesting species will doubtless be found breeding on laurel throughout the Appalachian region."

In addition to the eastern species of *Lygus* above treated, there is one described by Reuter which is at present unknown. A translation of his Latin description is therefore given as follows:

— (1022). *LYGUS CAROLINÆ* Reuter, 1876, 71.

"Oblong-ovate, greenish, minutely punctured above, pale pubescent; antennæ testaceous, fuscous toward apex, second segment longer than the width of the pronotum at base; scutellum with two longitudinal fuscous

stripes; hemelytra immaculate, cuneus with the base fuscous, its apex broadly black; abdomen black above; apices of the femora annulated with fuscous, apices of the tarsi black; tibiæ impunctate-testaceous; membrane marked with fuscous, veins greenish. Length, 5.3 mm."

Described from "Carolīnam." Recorded from Brownsville and Galveston, Tex., by Snow (1906, 152).

XX. TROPIDOSTEPTES Uhler, 1878, 404.

Elongate-oval, shining, subglabrous species having the head short, porrect, face vertical, vertex convex, its basal margin carinate; eyes small, reniform, compressed; beak reaching middle coxæ; antennæ rather stout, shorter than body; pronotum subtrapezoidal, strongly narrowed from base to apex, sides straight, their margins carinate, calli smooth, prominent, disk coarsely punctate both between and in front of them, its hind portion convex, somewhat flaring, coarsely and unevenly punctate, the hind angles and basal margin broadly rounded; scutellum equilateral, convex, coarsely rugose-punctate; elytra entire, cuneus and membrane deflexed, the fracture prominent; hind tarsi with joints 1 and 2 subequal, united equal to 3. One of the two known North American species occurs in the eastern states.

820 (1039). TROPIDOSTEPTES CARDINALIS Uhler, 1878, 404.

Elongate-oval, broadest across apex of commissure. Bright red fading to brick-red, sometimes to dull greenish-yellow; antennæ, tylus, legs in great part, apical half of clavus and inner half of apical third of corium, blackish; membrane fuscous; front and middle femora with a pale ring near apex; prosternum, basal half of tarsi and coxæ dull yellow; tips of tarsi and beak fuscous; ventrals in part dusky, sparsely clothed with yellow hairs. Joint 1 of antennæ stoutest, glabrous, subequal in length to width of vertex; 2 sparsely pilose, twice as long as 1; 3 and 4 very slender, pilose, united two-thirds the length of 2, 4 one-half the length of 3. Length, 5.5—6 mm.

Marion, Putnam and Crawford counties, Ind., May 10—Aug. 14; beaten from foliage of ash. Milford, Conn., June 12 (*Porter*). Ranges from New England west to Michigan and Illinois and southwest to Jacksonville, Fla. Breeds on ash. For an account of its life history see *Psyche*, XXIII, 1916, pp. 1—3.

XXI. CYRTOCAPSIDEA Reuter, 1905a, 25.

Small oval species having the head wider across eyes than apex of pronotum, its front subvertical, rather acutely pro-

duced below the eyes; vertex in male much narrower than eyes, its base not carinate; pronotum trapezoidal, its apex only one-third the width of base, disk finely, densely and evenly punctate, its hind portion strongly convex, declivent forward, collar narrow but distinct, side margins obtusely carinate, calli small, the areas in front of and between them finely punctate, hind margin broadly rounded; scutellum convex, as long as commissure, obtusely carinate at middle, distinctly punctate; elytra entire, smooth, opaque, slightly surpassing abdomen, clavus and cuneus both strongly declivent. Three neotropical species are known, one from our territory.

821 (—). *CYRTOCAPSIDEA VARIEGATA* sp. nov.

Short, oval. Head brown, both it and front half of pronotum thickly clothed with golden-yellow scale-like hairs; pronotum fuscous-brown, its sides and basal angles dull yellow; scutellum reddish-brown, its carina and apex dull yellow; clavus fuscous, paler at base and apex; corium fuscous along claval suture, outer half dull yellow; embolium fuscous, vaguely flecked with small yellowish spots; cuneus reddish-fuscous, its tip and inner margin pale yellow; membrane dusky hyaline, basal half of cells fuscous, veins and outer edges pale; legs pale yellow, femora tinged with fuscous; under surface fuscous-brown, middle of ventrals and genital paler. Joints 1 and 2 of antennæ straw-yellow, 1 slightly longer than width of vertex, 2 distinctly thicker toward apex, three and a half times longer than 1; 3 and 4 fuscous, united subequal in length to 2. Elytra and base of scutellum thinly clothed with yellow, scale-like hairs. Length, 2.4 mm.

R. P. Park, Fla., March 17; one male swept from roadside herbage. Easily known from our other species of *Capsaria* by its short oval form, very large eyes, opaque impunctate elytra and floccose yellow scales on head and front half of pronotum.

XXII. *NEOBORUS* Distant, 1884, 276.

Oblong or oblong-oval shining species having the head immersed in thorax to eyes, its front nearly vertical; eyes very prominent, compressed, overlapping front angles of pronotum; vertex subdepressed, its base margined; antennæ shorter than body, joint 1 glabrous, but little thicker than 2; pronotum trapezoidal, its sides straight, their margins carinate, calli smooth, prominent, the area between and in front of them punctate, hind portion convex, declivent forward, coarsely punctate, hind angles obtusely rounded, basal margin subtruncate; scutellum feebly convex, sparsely irregularly punctate;

elytra entire, surpassing abdomen by two-thirds the length of membrane. Nine species and two varieties have been described from the eastern states. All breed on the foliage of ash.

KEY TO EASTERN SPECIES OF NEOBORUS.

- a. Upper surface practically glabrous.
- b. First joint of antennæ pale, rarely slightly dusky.
- c. Corium without a curved reddish or blackish line, which is widened to cover its apical fourth; membrane wholly pale or only faintly tinged with dusky.
- d. Upper surface black or piceous-black; cuneus pale, its apex darker; corium sometimes with a small pale spot at base. 822. GEMINUS.
- dd. Upper surface more or less pale; pronotum and apical third of corium usually marked with reddish; scutellum in great part or wholly pale. 823. AMENUS.
- cc. Corium with a reddish or blackish line beginning on outer margin of radius, curving inwardly and widened to cover the apical fourth of corium; membrane with a fuscous spot at base and another at apex of its larger cell. 824. PALMERI.
- bb. First joint of antennæ brownish-black; scutellum brownish-black, its sides or basal angles pale; elytra brownish-black to piceous, the basal half or more of corium and embolium pale or yellowish. 825. GLABER.
- aa. Upper surface distinctly pubescent.
- e. Basal joint of antennæ blackish.
- f. Cuneus always pale; scutellum brownish at middle of base, or brown with median line and margins paler; elytra often in great part fusco-brownish. 826. CANADENSIS.
- ff. Cuneus reddish-brown; scutellum brownish-black each side of median line, its basal angles paler; elytra reddish-brown, sub-translucent. 827. RUFUSCULUS.
- ee. Basal joint of antennæ pale.
- g. Upper surface, including scutellum, black; cuneus pale translucent; legs pale; larger, length 6 or more mm. 828. TRICOLOR.
- gg. Upper surface more or less pale; scutellum in part yellow; smaller, not over 5.2 mm.
- h. Scutellum with entire median line black; female with embolium and outer margin of corium blackish, inner apical angle of corium pale. 829. VITISCUIS.
- hh. Scutellum yellow or with base blackish, never with median line black; female with embolium chiefly pale, inner apical angle of corium black. 830. PUBESCENS.

822 (1042). *NEOBORUS GEMINUS* (Say), 1832, 24; I, 344.

Elongate-oblong. Black or piceous, glabrous, shining; head reddish-brown, tylus, cheeks and some vague marks on vertex piceous-brown; pronotum and scutellum shining black, the lateral and basal margins of

the former narrowly edged with pale; elytra black or piceous-black, the outer portion of basal half of corium sometimes dull yellow; cuneus pale yellow, the extreme tip piceous; base and cells of membrane in great part dusky, apical half paler; legs, first antennal and base of second straw-yellow; under surface piceous, genital region paler. Pronotum and scutellum more coarsely, closely and evenly punctate than in *amœnus*. Elytra finely densely and evenly punctate. Length, 4.8—5.2 mm.

Posey County, Ind., June 6. Described from Indiana and recorded elsewhere only from Massachusetts, Connecticut and New York. Say mentions a large whitish-yellow spot at "tip of corium" which, unless he referred to the cuneus, is not present in my specimens.

823 (1041). *NEOBORUS AMÆNUS* (Reuter), 1909, 48.

Oblong-oval. Color exceedingly variable, in the typical form greenish-yellow, glabrous, shining, with apex of tylus, cheeks, a median line on vertex, usually five lines or oblong spots on disk of pronotum, inner apical half of clavus and apical third of corium, bright reddish or blackish; cuneus and membrane a uniform pale translucent; legs pale greenish-yellow, apical third of hind femora with two reddish spots; tarsal claws and tip of beak fuscous. Antennæ greenish-yellow, the tips of joints 2 and 3, and all of 4 fuscous; joint 1 about one-third longer than width of vertex; 2 nearly two and a half times the length of 1, male, twice as long as 1, female; 3 slightly longer than 4, the two united two-thirds the length of 2. Pronotum rather sparsely, deeply and unevenly punctate.

Scutellum with but few widely scattered punctures. Clavus coarsely and rather closely punctate, corium more finely and sparsely so. Length, 4.8—5.2 mm. (Fig. 175).

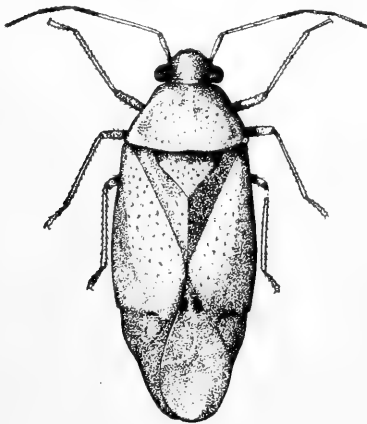


Fig. 175, X 10.
(After Dickerson & Weiss).

Marion, Vermilion and Posey counties, Ind., May 11—Sept. 18; swept from foliage of ash sprouts in low moist alluvial grounds (*W. S. B.*). Evanston, Ill., Aug. 20 (*Gerhard*). Staten Island, N. Y., and Trenton, N. J. (*Davis*). Breeds on several species of ash throughout its range, which extends from Quebec and New England west to the Dakotas and Kansas; not recorded in the east south of Maryland. Uhler (1894, 264) states that it is very common in Maryland on the linden tree

and that it "presents all the varieties of color and marking possible to its plan of development." In New Jersey it has been recorded by Dickerson and Weiss (1916, 302) as doing much damage to four kinds of ash. They give a full account of its life history. The early records of the species were mostly under the name *Neoborus sarcus* Dist., a species described from Panama.

As above stated, the color in *amœnus* varies greatly with age, the red markings becoming blackish in older specimens. Reuter (loc. cit.) described five color varieties. These all breed on ash, and so merge into one another that the names are almost superfluous. One of them, *palmeri*, was raised to specific rank by Knight. The typical form is the one above described. Knight separates the other two found in the east as follows:

KEY TO COLOR VARIETIES OF NEOBORUS AMÆNUS.

- a. Chiefly blackish, lateral and median vittæ on pronotal disk, scutellum except basal angles and median line at base, and corium more or less pale; membrane pale. 823a. var. SIGNATUS.
- aa. Chiefly black, cuneus and sometimes narrow base of corium pale; scutellum pale yellowish; membrane pale fumate, paler bordering apex of cuneus. 823b. var. SCUTELLARIS.

823a (1041c). *NEOBORUS AMÆNUS SIGNATUS* (Reuter), 1909, 49.

Color as in key; clavus and corium blackish, tinged with reddish, the area along the claval vein and outer basal half of corium yellowish; cuneus pale translucent, dusky at tip; membrane pale fuscous, veins, spot on larger cell and margins along cuneus, paler.

Tyler, Minn., June 23 (*Minn. Univ. Coll.*). Recorded only from New York and Washington, D. C.

823b (1041d). *NEOBORUS AMÆNUS SCUTELLARIS* (Reuter), 1909, 49.

Form and size of *amœnus*. Head chiefly black. Pronotum wholly black or with collar, edges and vague discal stripes pale; scutellum lemon-yellow, its base often black; basal half of corium often in part or wholly pale; apical fourth of hind femora brownish; under surface except genital plate wholly shining black.

Marion Co., Ind., May 30—June 4. Beaten from ash. Described from Kansas. Range the same as the typical form.

824 (1041a). *NEOBORUS PALMERI* Reuter in Van Duzee, 1908, 112.

More elongate than *amœnus*. Straw-yellow, strongly shining with a brownish gloss; tylus and an oblong spot below base of each antenna piceous; pronotum with a narrow marginal line each side and a broader submarginal stripe, the latter reaching from callus to base, dark brown; clavus and base of scutellum tinged with pale brown, corium with dark

stripe as in key, embolium and cuneus pale translucent; legs greenish-yellow, tips of beak and tarsi and often the sides of pleura piceous. Antennal joints 3 and 4 and apex of 2, fuscous. Length, 5.2—5.7 mm.

Marion Co., Ind., July 31; swept from coarse grasses along the side of a railway embankment (*W. S. B.*). Clarke, Lake Co., Ind., Aug. 6 (*Gerhard*). Ranges from Quebec and New England west to Michigan and Indiana. Food plants the white ash, *Fraxinus americana* L., and probably other species of ash. As in *amœnus* the markings on corium are red in young specimens, fuscous-brown in old ones. The beak apparently varies somewhat in length, in the specimens at hand reaching only to base of middle coxæ.

825 (—). *NEOBORUS GLABER* Knight, 1923, 563.

Oblong-oval. Color mainly as in key; pronotum brownish-yellow, propleura, calli and a stripe, widening behind, each side of disk extending from calli to subbasal margin, brownish-black; cuneus yellowish translucent, its apical third and inner margin fuscous; membrane uniformly fuscous, veins slightly paler; legs yellowish, middle and hind femora with two subapical brownish bands; ventrals dull yellow, a line each side of middle and genital segment brownish. Antennæ brownish-fuscous, joint 1 one-half as long as width of head across eyes, 2 three times as long as 1, 3 subequal in length to 1, one-third as long as 2, 4 three-fourths the length of 3. Beak reaching between middle coxæ. Pronotum, scutellum and elytra glabrous, shining, coarsely punctate. Length, 4.6—4.8 mm.

Marion Co., Ind., June 4—26; beaten from ash (*W. S. B.*). St. Anthony Park, Minn., June 6 (*Minn. Univ. Coll.*). Ranges from Ontario and New England west to the Dakotas; occurring from June to August on ash. The dark markings on pronotum and femora are often vague.

826 (1045). *NEOBORUS CANADENSIS* (Van Duzee), 1912a, 486.

Head, including tylus, piceous-brown with cheeks and a median line on vertex pale; pronotum with apical half fuscous, basal half brown, calli in part and median stripe pale; elytra in part or wholly dark brown, thinly clothed with inclined yellowish hairs, embolium and cuneus pale yellow, the former with outer edge, the latter with tip, blackish; membrane brown, veins paler; middle of under surface pale yellow, the sides with a broad fuscous stripe; legs yellow, the hind femora with two subapical dark rings. Joint 1 of antennæ black, one-fifth longer than width of vertex, 2 fuscous-brown, darker at base, three times the length of 1, 3 and 4 fuscous, 3 as long as 1, 4 two-thirds the length of 3. Beak reaching apex of middle coxæ. Pronotum transversely rugose with small but distinct punctures between the rugæ. Scutellum transversely strigose. Elytra finely densely and shallowly punctate. Length, 5—5.3 mm.

Hamilton Co., N. Y. (*Davis*). Recorded only from Ottawa, Ontario; New York and doubtfully from California. Occurs mainly on white ash. The elytra vary in hue from dull yellowish-testaceous to dark brown.

827 (—). *NEOBORUS RUFUSCULUS* Knight, 1923, 564.

Oblong-oval. Color mainly as in key; head dull yellow, tylus, cheeks and median line of front usually blackish; pronotum brownish-black, collar, median line on disk, spot behind outer basal angle of each callus and narrow basal margin, straw-yellow; membrane and veins brownish-fuscous; legs dull yellow, tips of middle femora, apical half of hind ones, base of tibiæ and middle of hind ones blackish; ventrals blackish, paler at middle. Antennæ fuscous, joint 1 darker, one-third longer than width of vertex, 2 three and one-fourth times the length of 1, 3 slightly longer than 1, 4 two-thirds the length of 3. Beak reaching between middle coxæ. Upper surface, except head and membrane, rather coarsely and closely punctate, clothed with suberect yellowish pubescence. Length, 4.6—4.9 mm.

Lakeland, Minn., June 14 (*Minn. Univ. Coll.*). Recorded only from New York. Breeds on white ash, *Fraxinus americana* L.

828 (1043). *NEOBORUS TRICOLOR* (Van Duzee), 1912a, 487.

Elongate-oval. Head reddish-brown or paler, tylus in great part black, its base and upper portion of cheeks piceous; pronotum, scutellum and elytra shining black, rather thickly pubescent with fine grayish inclined hairs; cuneus white; membrane wholly dark fuscous; legs pale greenish-yellow thickly hirsute with erect hairs; tip of beak and tarsal claws piceous; antennæ hirsute, dull yellow, the apical fourth of second joint dusky; ventrals reddish-brown, clouded with darker. Vertex and face broader than in *amœnus*. Pronotum longer, more narrowed in front, its disk, except calli, coarsely, deeply and evenly punctate. Scutellum and clavus transversely strigose, punctured between the strigæ; corium finely and closely punctate. Length, 6—6.5 mm.

Marion Co., Ind., June 4—26. Swept in some numbers from ash sprouts in low dense woodlands of the White River bottoms. Recorded only from New Jersey and Missouri. It is our largest species and easily known by the finely pubescent, black upper surface and pale cuneus.

829 (—). *NEOBORUS VITTISCUTIS* Knight, 1923, 566.

Oblong-oval. Color mainly as in key; head blackish, margin of cheeks and loræ paler; pronotum black, spot near middle, a vague ray behind each callus, and carinæ of side margins yellowish; elytra black, male; pale brownish-yellow with embolium, except tip, and outer margin of corium black, female; cuneus pale translucent; membrane fuscous, paler in female; legs straw-yellow, tips of tarsi only dusky; ventrals black. Antennæ dull yellow, joint 1 one-half longer than width of ver-

tex, 2 two and three-fourth times the length of 1, 3 two-fifths as long as 2, 4 three-fifths the length of 3. Beak reaching between middle coxæ. Upper surface shining, coarsely punctate, each puncture bearing a suberect pale hair. Length, 4—5 mm.

Recorded only from Virginia and Missouri.

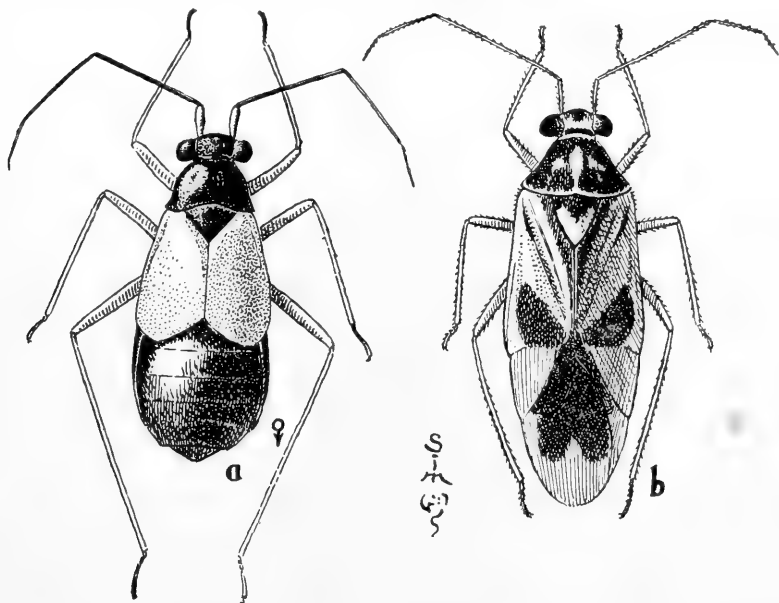


Fig. 176. *a*, *Mecomma gilvipes* (Stal), female X 15; *b*, *Neoborus pubescens* Knight X 11. (After Drake, Tech. Publ. 16, N. Y. St. Coll. For.).

830 (—). *NEOBORUS PUBESCENS* Knight, 1917a, 81.

Oblong, sides subparallel, male, more oval, female. Head reddish-brown, usually with tylus, median line and a dash each side of eyes, blackish; pronotum black, the middle of collar, a median line dilated at middle, narrow edges of side and basal margins, and often one or two vague stripes behind the calli, pale yellow; scutellum as in key; elytra with clavus and a broad bar reaching across apical third of corium, black or piceous, remainder of corium and entire cuneus pale yellow; membrane dusky, the cells and veins darker; antennæ and legs pale yellow, under surface black, usually paler on middle and genital segment. Pronotum with sides distinctly carinate only on apical half, disk except calli, rather finely, deeply and evenly punctate, both it and elytra sparsely clothed with suberect yellowish hairs. Scutellum very sparsely punctate. Length, 4.5—4.8 mm. (Fig. 176, *b*).

Marion Co., Ind., June 12; beaten from black ash (*W. S. B.*). Palos Park, Ill., July 4 (*Gerhard*). The known range extends from New England west to Michigan and Illinois. Hussey recorded it as common in June and July on the black ash, *Fraxinus*

nigra Marsh., in the dune region of southern Michigan. Knight (1923, 566) says that the food-plant is "*Fraxinus americana* but found developing only on young plants in much shaded situations." This species seems to form a sort of connecting link between the genera *Neoborus* and *Xenoborus*, as only the front half of pronotum has the sides carinate.

XXIII. XENOBORUS Reuter in Van Duzee, 1908, 112.

This genus is very close to, if not a synonym of, *Neoborus*. It differs mainly in the characters given in the generic key, p. 752, and, as stated above, the carinæ of side margins of pronotum in *Neoborus pubescens* are abbreviated, that species therefore connecting up the two genera. Four species are known, all occurring in our territory.

KEY TO EASTERN SPECIES OF XENOBORUS.

- a. Larger, length 6.4 or more mm.; upper surface in great part greenish-yellow, darker only along the sides of the claval commissure. 831. COMMISSURALIS.
- aa. Smaller, length not over 5.7 mm.; elytra usually in great part dark brown or blackish.
 - b. Membrane fuscous with an oval paler spot at middle; calli and a spot or stripe each side of median line of pronotum, inner half of clavus and a spot on apical third of corium, dark brown or fuscous-black; length, 5 mm. 832. PLAGIFER.
 - bb. Membrane uniformly dark fuscous or black.
 - c. Hind tibiæ wholly pale; hind femora pale or rarely dusky near apex; embolium, basal half of corium and entire cuneus pale in both sexes; length, 5.4 mm. 833. NEGLECTUS.
 - cc. Hind tibiæ fuscous, blackish near base; hind femora blackish apically or annulate with dark and pale; embolium and basal half of corium dark, rarely pale in female. 834. PETTITI.

831 (1046). *XENOBORUS COMMISSURALIS* Reuter in Van Duzee, 1908, 112.

Pale greenish-yellow, more or less tinged with reddish-brown; front of head and calli pale brownish-yellow tinged with reddish, strongly shining, tylus black; scutellum wholly greenish-yellow; apical half of clavus dark brown to fuscous, cuneus pale yellowish translucent; membrane dusky, paler along the margins; legs pale yellow, tip of beak and tarsal claws darker; antennæ dark brown to fuscous-black, the incisures paler. Beak reaching middle coxæ. Joint 1 of antennæ about as long as head; 2 twice as long as 1, female, two and a half times longer than 1, male; 3 and 4 much more slender, 4 one-half the length of 3. Pronotum about one-fifth shorter than its basal width, calli prominent, disk behind them thickly and rather coarsely rugose-punctate. Scutellum sparsely, similarly punctate. Elytra finely and sparsely punctate, each puncture bearing a very fine suberect yellowish hair. Length, 6.4—7 mm.

Crawford Co., Ind., May 19. Its recorded range extends from Quebec and New York west to Minnesota. Food plant the black ash.

832 (1047). *XENOBORUS FLAGIFER* (Reuter), 1909, 51.

Elongate-oblong. Greenish-yellow, glabrous, shining, with dark markings as in key, tylus and some irregular marks on vertex brown; scutellum yellow, its narrow side margins, inner half of clavus, commissure, and a spot on apical third of corium, dark brown to fuscous-black; embolium and cuneus except apex, yellowish-translucent; legs greenish-yellow, the tip of beak and apical joint of tarsi blackish; under surface pale along middle, but with a broad dark stripe along the sides. Antennæ slender, joints 1 and 2 blackish, 1 about as long as width of head across eyes, 2 twice as long as 1; 3 and 4 dusky, 3 two-fifths as long as 2, 4 half the length of 3. Pronotum, except calli, coarsely, deeply, rather closely and evenly punctate, its hind angles and basal margins broadly rounded. Scutellum and clavus transversely rugose with coarse punctures between the rugæ; corium finely and sparsely punctate, the punctures without hairs. Length, 5—5.3 mm.

Carlton Co., Minn., Aug. 18 (*Minn. Univ. Coll.*). Recorded only from Ontario, New York and Minnesota. Occurs on the black ash, *Fraxinus nigra* Marsh.

833 (—). *XENOBORUS NEGLECTUS* Knight, 1917a, 82.

Elongate, sides subparallel. Head dull yellow, flecked with reddish, the lower half fuscous, vertex with basal carina and median dash blackish; antennæ fuscous, joint 1 paler at base; pronotum black, collar, a large median spot on disk and side margins pale yellow; mesoscutum blackish; scutellum pale yellow; elytra blackish with pale markings as in key; membrane fuscous, paler at middle in female; legs pale yellow, hind femora as in key. Pronotum without carinæ, punctate as in *plagifer*. Length, 5.4 mm.

Known only from New York and Michigan.

834 (1044). *XENOBORUS PETTITI* (Reuter), 1909, 50.

Oblong-oval. Color variable, usually black with scutellum, embolium, basal half of corium and cuneus more or less pale; collar and sometimes the basal edge of pronotum yellow; front of head and disk of pronotum sometimes reddish. Antennæ dark brown or black, base of joint 1 and often that of 2 yellowish; joint 1 about as long as head in front of eyes, 2 twice as long as 1, subequal in length to width of pronotum at base, male, one-sixth shorter, female; 3 two-fifths as long as 2, 4 one-half the length of 3. Pronotum with space between and in front of calli finely punctate, remainder of disk coarsely so. Scutellum unevenly transversely strigose and punctate. Elytra finely, closely and evenly punctate. Length, 5.7—6.3 mm.

New Haven, Conn., June 22—Sept. 28 (*Walden*). Ramsey Co., Minn., June 15 (*Minn. Univ. Coll.*). Described from Pennsylvania. Recorded elsewhere only from Massachusetts and New York. Occurs on white ash in June and July.

Tribe III. MYRMECORINI Kirkaldy, 1906, 372.

This tribe contains but two genera and comprises slender-bodied, dull colored Mirids of medium size possessing the characters given under *aa* in the Key to Tribes of Capsinæ, p. 681, and having the head porrect its front strongly vertical, vertex with a groove or median impression; antennæ slender, as long as or longer than body; beak reaching or surpassing hind coxæ; pronotum subcampanulate, its posterior portion strongly convex, more or less flaring; elytra long and slender, distinctly constricted near middle.

KEY TO EASTERN GENERA OF MYRMECORINI.

- a.* Joint 1 of antennæ nearly one-half longer than greatest width of head; scutellum not conically produced; upper surface with fine, short pubescence. I. PARAXENETUS, p. 794.
- aa.* Joint 1 of antennæ but little longer than width of vertex; scutellum conically produced upward; upper surface, especially the pronotum and scutellum, with long erect hairs. II. BARBERIELLA, p. 795.

I. PARAXENETUS Reuter, 1907, 46.

Elongate, slender, subcylindrical species having the head short, broad, slightly exserted, but little produced in front of eyes, its front vertical; eyes very large, longer than wide; antennæ one-third longer than body, very slender, not tapering; beak reaching first ventral; pronotum subcampanulate, its front portion subcylindrical, without lateral carinæ, hind lobe strongly convex; elytra entire, surpassing abdomen, constricted at middle; legs long and slender, joints 1 and 3 of hind tarsi subequal, 2 shorter. One species is known.

835 (919). PARAXENETUS GUTTULATUS (Uhler), 1887c, 150.

Elongate, subcylindrical. Pale brown, when fresh usually more or less tinged with reddish; basal half of pronotum, scutellum and apical third of corium often fuscous-brown, cuneus with a small vague yellow spot at base; joints 1—3 of antennæ, tibiæ, tip of scutellum, a dot on corium near tip of commissure, hind coxæ and ventrals 1 and 2, pale straw-yellow; membrane pale at base, fuscous toward apex; femora pale reddish-brown, their apical halves more or less tinged with fuscous, the hind ones with apical third vaguely annulate with yellow; ventrals 3—6 fuscous. Joint 1 of antennæ as long as head and pronotum united, 2 nearly two and a half times longer than 1, 3 four-fifths the

length of 2, 4 dark reddish-brown, three-tenths the length of 3. Front lobe of pronotum with a small median impression. Scutellum convex, longer than broad, strongly tapering behind. Elytra with short, very sparse prostrate yellow hairs, a faint yellow spot near middle. Hind femora rather stout, subfusiform, feebly curved. Length to tip of membrane, 6—7 mm. (Fig. 177).

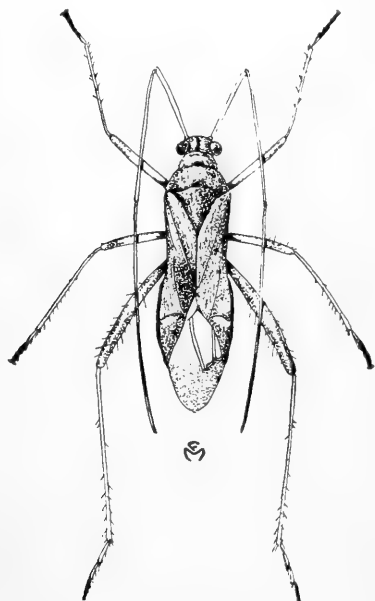


Fig. 177, X 6. (Original).

Warren, Vermilion and Marion counties, Ind., July 21—Sept. 1. Only a few specimens were taken at each station, usually by sweeping nettles and other herb-age in low moist grounds. Ranges from New York west to Illinois and southwest to Texas. Uhler says that in Maryland it occurs on *Liriodendron* and grape vines. Banks (1907, 425) found it quite abundant in August at Falls Church, Va., on the foliage of tulip trees. "They were difficult to recognize at rest, and when disturbed were very active and difficult of capture."

II. BARBERIELLA Poppius, 1914a, 255.

Slender bodied ant-like species having the head wider than apex of pronotum, its front vertical, vertex impressed, not grooved; beak reaching upon hind coxæ; pronotum with front lobe subcylindrical, hind one strongly convex, flaring basally; mesoscutum broadly exposed; disk of scutellum convex, conical, the apex of cone bent backward; elytra strongly constricted at middle, disk nearly flat; hind tibiæ compressed, strongly curved. One species occurs in our territory, another in Texas.

836 (—). *BARBERIELLA APICALIS* Knight, 1923, 657.

Head and pronotum brownish-black, clothed with pale pubescence and sparse suberect hairs; scutellum dark brown; clavus and base of corium fuscous-brown; middle of corium with a transverse pale spot followed by a shining fuscous or brown cross-bar, the apex pale brown; cuneus brownish-translucent, strongly deflexed; membrane fuscous-brown, veins slightly darker; legs dark brown, femora alutaceous, tibiæ beset with yellow setæ; ventrals blackish-brown, a pale spot on middle

of sides. Antennæ dark brown, joint 1 one-fifth longer than width of vertex; 2 cylindrical, four times as long as 1; 3 more slender, one-half the length of 2; 4 three-fifths the length of 3. Length, 5—5.5 mm.

Recorded only from Staten and Long Islands N. Y., where it was taken by Davis in July and August.

Subfamily III. **ORTHOTYLINÆ** Van Duzee, 1916a, 203.

This subfamily comprises Mirids of very diverse form, size and appearance, but all agreeing in having the arolia between the tarsal claws distinct, erect, with tips converging (pl. X, figs. 33—54), and pronotum without a distinct collar. The membrane is glabrous, usually with two distinct cells; cell of inner wings without a hamus; tibiæ narrowed toward apex, usually distinctly spinose; third tarsal joint longer than either of the others. For convenience of study the subfamily is divided into eight tribes.

KEY TO TRIBES OF SUBFAMILY ORTHOTYLINÆ.

- a. Eyes pedunculate; head very broad. I. LABOPINI, p. 797.
- aa. Eyes not pedunculate; head not unusually broad.
 - b. Flanks of pronotum separated from the disk by a distinct suture; hind portion of pronotal disk elevated or on a higher plane than and projected above the base of scutellum; upper surface thickly clothed with erect bristly pubescence. II. SEMINI, p. 798.
 - bb. Flanks of pronotum not separated from disk by a suture; base of pronotal disk not projecting above the scutellum.
 - c. Body robust, short oval or ovate, often brachypterous; hind femora thickened, saltatorial; head strongly vertical, the vertex, viewed from above, wider than length of head. III. HALTICINI, p. 799.
 - cc. Body more elongate; hind femora normal; length of head (except in *Pilophorini*) usually greater than width of vertex.
 - d. Slender ant-like species with broad head; form usually elongate with body constricted at middle; pronotum with sides sulco-sinuate, the apical half of disk narrowed; elytra usually with narrow cross-bars of silvery deciduous scale-like hairs. IV. PILOPHORINI, p. 806.
 - dd. Form not ant-like; sides of pronotum not sulco-sinuate; elytra devoid of silvery markings.
 - e. Joint 3 of antennæ as thick as joint 2, or nearly so; females often brachypterous.
 - f. Pronotum not distinctly campanulate, its apex wider than vertex; elytra not coarctate at middle; abdomen broad at base. V. CERATOCAPSINI, p. 819.
 - ff. Pronotum campanulate, its apex scarcely wider than vertex; form slender with elytra coarctate at middle; abdomen narrowed at base. VI. SYSTELLONOTINI, p. 830.
 - ee. Joint 3 of antennæ distinctly more slender than joint 2.

- g.* Sides of pronotum distinctly carinate; front margin of pronotum usually elevated in a collar-like ridge by a transverse depression before the calli; width of vertex greater than length of head; front of head strongly produced vertically; body opaque or nearly so. VII. LOPIDINI, p. 831.
- gg.* Sides of pronotum not carinate, or if so, the front margin of pronotum not elevated; head usually as long as or longer than width of vertex, its front less vertical; body more or less shining. VIII. ORTHOTYLINI, p. 844.

Tribe I. LABOPINI Reuter, 1883, 567 (*Laboparia*).

This tribe contains only a single genus which is easily distinguished by the wide head and pedunculate eyes.

I. LABOPS Burmeister, 1835, 279.

Oblong-oval hirsute species having the head across eyes wider than base of pronotum; front vertical; eyes projecting outward far beyond front angles of pronotum; beak reaching between hind coxæ; antennæ two-thirds the length of body, hirsute, joints 3 and 4 more slender than the others; pronotum trapezoidal, wider at base than long, base one-third wider than apex, sides straight, disk feebly declivent, calli present but low; scutellum triangular, equilateral; elytra dimorphic, in macropterous forms surpassing abdomen with membrane well developed; in brachypterous ones reaching sixth dorsal, with disk convex and tips broadly separately rounded, membrane absent, clavus and cuneus scarcely differentiated. Two species occur in our territory.

KEY TO EASTERN SPECIES OF LABOPS.

- a.* Cheeks of male strongly convex, concealing base of tylus when viewed from the side; front of vertex of female strongly declivent. 837. HESPERIUS.
- aa.* Cheeks of male less convex, base of tylus visible as viewed from the side; vertex nearly horizontal in both sexes. 838. BURMEISTERI.

837 (1117). LABOPS HESPERIUS Uhler, 1872, 416.

Oblong, sides subparallel, male, suboval, female. Upper surface thickly clothed with long inclined yellowish hairs, intermixed with appressed scale-like pubescence. Head black, shining; loræ, cheeks, median longitudinal line on vertex and a triangular spot at inner basal angle of each eye extending along base of vertex, yellowish-white; pronotum and elytra black, opaque, the latter with embolium and sometimes the outer third of corium pale yellow; membrane fuscous, veins black; legs fuscous-black, the middle of hind tibiæ, tips of all femora and some spots on their under surface dull yellow; under surface shining black, thickly

clothed with suberect yellowish hairs. Joint 1 of antennæ subequal in length to two-thirds the width of vertex; 2 more slender than and two and two-third times longer than 1; 3 two-fifths the length of 2, 4 slightly longer than 3. Pronotum except calli, scutellum and elytra all transversely rugose. Length, 4.3—4.6 mm.

Wilmington and Whiteface Mountain, N. Y., July (*Davis*). Paris, Me., June 10 (*Frost*). Georgetown, Colo., July 28 (*Gerhard*). A species of northern distribution ranging from Quebec and New England west to the Pacific. Described from Colorado and Montana. Recorded also from New Mexico. But little regarding its habits has been published, though it seems to inhabit, for the most part, mountainous regions. Drake (1923, 77) mentions it as occurring on grasses and weeds about Cranberry Lake, N. Y. In the macropterous forms from Maine and New York the hairs of hind tibiæ are fewer and shorter than the spines, while in the Colorado specimens at hand they are about as long as the spines, and the middle of hind and middle tibiæ are vaguely dull yellow. In these characters those from Colorado appear to be intermediate in form between Knight's *L. hirtus* (1922a, 258) and Uhler's species. Van Duzee states⁸³ that one specimen in his material "has the tibiæ altogether black with the long tibial hairs and male claspers of *hirtus*, so the color of the tibiæ cannot be relied upon in separating these forms." As the description of *hirtus* agrees otherwise in every particular with that of *hesperius*, I regard Knight's name as a synonym.

838 (1118). LABOPS BURMEISTERI Stal, 1858, 189.

"Oval. Blackish, opaque, clothed with silken yellow pubescence; head with a transverse basal line, curved forward on both sides and interrupted at middle, a spot beneath the eyes, cheeks, narrow pectoral margins adjoining coxæ, and a wide annulus on middle of tibiæ, sordid yellow. Membrane wanting. Female, length 4.3 mm.; width 2 mm." (*Stal*).

The above is a free translation of the brief original description. It is a palæarctic species, described from Kamchatka and recorded in this country from the Adirondack region, New York, Sudbury and the Abitibi region, Ontario, and Alaska.

Tribe II. SEMIINI Knight, 1923, 497.

This tribe also contains but a single genus which is easily separated from others of the subfamily by the presence of a

⁸³Pan Pacific Entomologist, II, 1926, 163.

suture separating the propleura or flanks of pronotum from the disk.

I. SEMIUM Reuter, 1876, 80.

Small oblong opaque species having the head short, broad, inserted in thorax to eyes, its front subvertical; beak reaching middle coxæ; pronotum strongly narrowed and declivent from base to apex, base more than twice the width of apex, front portion of disk with two transverse impressions, hind portion strongly convex; elytra entire, surpassing tip of abdomen; second joint of hind tarsi nearly twice the length of first. One species is known.

839 (1186). SEMIUM HIRTUM Reuter, 1876, 80.

Oblong, subcuneiform. General color velvety-brown; head, joints 1 and 2 of antennæ, and legs except tarsi, strongly tinged with reddish; apical fourth and flanks of pronotum reddish-yellow; scutellum, embolium, corium except apex and cuneus except tip, yellowish-white; membrane fuscous-brown; tarsi and joints 3 and 4 of antennæ dusky brown. Joint 1 of antennæ very short and stout, its length scarcely half the width of vertex; 2 almost as stout and five times as long as 1; 3 and 4 much more slender, 3 subequal in length to 2, nearly three times longer than 4. Length, 2.8—3.4 mm.

Marion Co., Ind., Sept. 12—Oct. 6, swept from *Euphorbia* along roadsides and railway embankments. Ranges from New York west to Iowa. Described from Texas and recorded from California. Occurs on the reddish under surface of the leaves of spurge (*Euphorbia*).

Tribe III. HALTICINI Kirkaldy, 1906, 130.

Small oval robust species having the head broad, its hind margin usually sharp, concentric with or overlapping the front margin of pronotum; antennæ slender, often as long or longer than body; beak reaching to or beyond middle coxæ; pronotum trapezoidal, sides straight, not carinate, calli distinct in the winged forms; scutellum triangular; mesoscutum usually concealed; elytra often dimorphic, the brachypterous form with cuneus and membrane frequently wanting. Other characters as in tribal key.

Knight (1923, 498) assigns four of our eastern genera to the tribe, two of which Van Duzee classed under the tribe *Orthotylini*. Some of the species are widely distributed and at times very injurious.

KEY TO EASTERN GENERA OF HALTICINI.

- a.* Head with a well defined sharp basal margin; color black.
- b.* Antennæ as long as or longer than body, joint 2 four or more times longer than 1; hind femora greatly flattened, saltatorial; brachypterous females oval and strongly convex; length less than 3.7 mm. I. *HALTICUS*, p. 800.
- bb.* Antennæ shorter, scarcely as long as elytra, joint 2 but little more than three times the length of 1; hind femora not greatly flattened; length more than 4 mm.
- c.* Antennæ with short fine pubescence; head and body nearly glabrous, shining black; length more than 4 mm. II. *STRONGYLOCORIS*, p. 803.
- cc.* Antennæ and head with long coarse black hairs, length of hairs on third antennal three times the thickness of segment; macropterous form with upper surface in part pale. III. *ORTHOCEPHALUS*, p. 804.
- aa.* Head without a sharp basal margin; upper surface clothed with appressed scale-like deciduous hairs intermixed with longer, more erect ones; color variable, but never black. IV. *PARTHENICUS*, p. 804.

I. *HALTICUS* Hahn, 1831, 113.

Short oval species having the head long, pointed, its front vertical; antennæ often longer than body, joint 1 cylindrical, shorter than head, 2 linear, four or more times longer than 1, 3 and 4 filiform, united longer than 2; macropterous forms with pronotum trapezoidal, nearly twice as wide at base as long; elytra, oval, convex, surpassing abdomen, widest behind middle, the divisions all present; brachypterous forms with pronotum subquadrate, but little wider than long; elytra shorter than abdomen, strongly convex, corium alone present; hind femora long, stout, somewhat curved, the inner side flattened. Other characters as in key and under tribal heading. Three species occur in the eastern United States.

KEY TO EASTERN SPECIES OF *HALTICUS*.

- a.* Body wholly devoid of deciduous scale-like pubescence; antennæ pale, joints 3 and 4 slightly dusky; length, 2.7 mm. 840. *APTERUS*.
- aa.* Body above with patches of deciduous scale-like pubescence.
- b.* Smaller, length not more than 2 mm.; joint 2 of antennæ yellowish at middle, blackish at tip and base. 841. *BRACTATUS*.
- bb.* Larger, length 2.5 or more mm.; joint 2 of antennæ pale, sometimes fuscous at tip. 842. *INTERMEDIUS*.

840 (1119). *HALTICUS APTERUS* (Linnæus), 1758, 438.

Oblong-oval, robust, convex. Black, shining, clothed with fine, short inclined hairs; femora black, their tips pale, tibiæ and joints 1 and 2 of

tarsi yellow, third tarsal and claws black; ventrals black with fine short grayish hairs. Pronotum minutely punctate, its basal half and disk of scutellum transversely wrinkled, calli subobsolete. Elytra, brachypterous form, obovate, reaching fourth dorsal, tips broadly rounded, disk shallowly and coarsely punctate. Length, 2.5—3 mm.

Shalford and Hurst Green, England (*British Mus. Coll.*). An introduced European species, recorded by Van Duzee as ranging in this country from New England west to Colorado and south to Maryland, but, according to Knight, correctly identified only from Maine and Canada. Macropterous forms are very scarce.

841 (1121). *HALTICUS BRACTATUS* (Say), 1832, 26; I, 348.

Males—Usually macropterous; oblong-oval, sides subparallel. Black, strongly shining, very thinly clothed with silvery gray hairs which, on the elytra are usually condensed into small spots; cuneus blackish translucent, its apex pale; membrane pale dusky translucent throughout; under surface and femora in great part black, front and middle femora with tips broadly pale, hind ones more narrowly so; tibiæ and tarsi yellowish, tarsal claws and basal third of hind tibiæ blackish. Joint 1 of



Fig. 178. *a*, Brachypterous female, X 10; *b*, full winged female, X 12; *c*, male, X 11; *d*, head of male in outline. (After Chittenden, U. S. Div. Ent.).

antennæ blackish, paler at base, three-fourths as long as width of vertex; 2 as in key, about four times longer than 1; 3 fuscous, the base yellowish, two-thirds the length of 2; 4 fuscous, one-half as long as 3. Head smooth, polished, vertex with a small round median impression. Surface of pronotum and elytra somewhat roughened, minutely granulate; membrane surpassing abdomen by three-fourths or more its length. Length, 1.8—2 mm. *Females*—Usually brachypterous and oval, broader and much more convex; color the same; pronotum shorter, subquadrate, much less declivent; elytra usually with coria alone present, reaching sixth dorsal, their tips separately broadly rounded. Length, 1.3—1.5 mm. (Fig. 178).

Frequent throughout Indiana, June 11—Oct. 16. Dunedin, R. P. Park and Sanford, Fla., Nov. 21—April 4. Occurs on foliage of many plants, both wild and cultivated, especially those growing in rich moist soil. Once taken by scores near Dunedin on turnip tops, and frequently swept from ferns in dense hammocks. Ranges from Ontario and New England west to Kansas and Utah and southwest to Florida. In later years, for some unknown reason, this species has been listed as *Halticus citri* (Ashm.) (1887, 155), but a careful study of the original descriptions of both authors leads me to believe Ashmead's name is an absolute synonym. Both descriptions were founded on the macropterous form and, as far as they go, agree in every particular. The males appear to be much more scarce than the females, and macropterous forms of the latter sex are very scarce. Webster (1897, 209) named 20 plants on which *H. bractatus* was found feeding. He stated that: "The insect feeds during all its development on the upper surface of the leaves, notably those of red clover, discoloring the entire leaf. They do not become abundant until early summer, and continue so until October, when they gradually disappear." Many of the older records were made under the name of *Halticus uhleri* Giard, also a synonym.

842 (1120). *HALTICUS INTERMEDIUS* Uhler, 1904, 360.

Broadly ovate, moderately convex. Black, strongly shining; membrane pale fuscous, cells darker; femora black, knees, tibiæ and tarsi pale. Antennæ very slender, reaching tip of cuneus, joint 1 dull yellow, darker at middle, two-thirds as long as width of vertex; 2 about twice as long as pronotum; 3 and 4 more slender, dusky yellow, united nearly as long as 2. Pronotum narrowed in front, side margins feebly reflexed, calli subobsolete. Elytra with costal margins strongly curved, disk inflated and with small patches of deciduous silvery or greenish scale-like hairs. Length, 2.5—3.5 mm.

Honesdale, Pa., Sept. 10 (*Olsen*). Described from Arizona. Recorded from New England, Pennsylvania and Michigan.

II. STRONGYLOCORIS Blanchard, 1840, 140.

Elongate-oval, glabrous, shining species having the vertex flattened, minutely punctate; pronotum about twice as wide at base as long, its posterior portion convex, not strongly declivent, hind angles obtusely rounded; scutellum triangular, subtectiform, finely strigose; elytra entire, surpassing abdomen, clavus with sides strongly declivent, cuneus and membrane also declivent, the fracture weak. Two of the five recognized North American species occur in our territory.

KEY TO EASTERN SPECIES OF STRONGYLOCORIS.

- a*. Second antennal of female a fifth longer than width of head across eyes; legs in part pale. 843. *STYGICUS*.
- aa*. Second antennal of female not longer than width of head across eyes; legs, except tips of femora and base of tarsi, dark brown to black. 844. *ATRATUS*.

843 (1123). *STRONGYLOCORIS STYGICUS* (Say), 1832, 24; I, 344.

Elongate- or oblong-oval. Black, moderately shining; cuneus piceous, membrane dark brown; tibiæ, tips of femora, joints 1 and 2 of tarsi and basal half of trochanters dull yellow. Joint 1 of antennæ dull yellow, its length less than half the width of vertex, its basal fifth black, female, wholly black, male; 2 with extreme apex and base blackish, middle dull yellow, female, wholly fuscous, male; 3 and 4 fuscous, paler at base, 3 three-fifths the length of 2, twice as long as 4. Pronotum and elytra densely minutely rugose-punctate, calli prominent, almost smooth. "Dextral male clasper with median angle produced in a long tooth, thus forming a semicircle with the incurved angle of the fan-shaped apex." (*Van D.*). Length, 4.3—5 mm.

Frequent throughout Indiana, May 24—Sept. 15. Occurs on the great ragweed, *Ambrosia trifida* L., and Virginia creeper, in alluvial soil along streams and on grasses and low herbage in dense woodland. Ashland, Mass., May 2 (*Frost*). Ranges from Quebec and New England west to the Pacific and southwest to North Carolina and New Mexico. Breeds on goldenrod and probably on wild sunflower and other Compositæ.

844 (1124). *STRONGYLOCORIS ATRATUS* (Uhler), 1894, 268.

Form and size of *stygius*. Black, more strongly shining; membrane dark fuscous-brown, the edge near tip of cuneus slightly paler; antennæ black or blackish-brown, the incisures alone paler; legs black, tibiæ dark brown, knees, tips of coxæ and basal joint of tarsi tinged with yellow. "Dextral male clasper with median angle obtuse or produced in a short

tooth, thus forming a shorter arc with the fan-shaped apex; the latter quadrifid, usually forming four acute teeth, the dorsal much the longer." (*Van D.*). Length, 4.7—5 mm.

Marshall, Starke, Marion, Putnam and Perry counties, Ind., May 16—July 5. Occurs on herbage along the banks of woodland streams. Described from California. Recorded from New Jersey, and by Van Duzee (1921a, 135) from Ottawa and Montreal, Canada, New Hampshire, New York and Colorado.

III. ORTHOCEPHALUS Fieber, 1858, 316.

Small, thickly pilose species having the head short, wider in female than in male, its front vertical; beak reaching middle coxæ; pronotum short, trapezoidal, nearly twice as wide at base as long, hind angles rounded; scutellum triangular, equilateral, with a transverse depression near base; elytra dimorphic, in male longer than abdomen with divisions distinct; in female very convex, shorter than abdomen, gradually widened from base to the rounded tips, without cuneus or membrane. One introduced European species occurs in the eastern states.

845 (—). ORTHOCEPHALUS MUTABILIS (Fallen), 1807, 98.

Elongate, subparallel, male, suboval, female. Black, thickly clothed with long suberect black hairs and short, yellowish scale-like pubescence. Macropterous form with corium piceous, its inner half and outer margin of clavus pale hyaline; membrane fuscous, paler at middle in and around the edges of cells. Brachypterous form with elytra wholly black. Antennæ black, almost as long as body, joint 1 subclavate, slightly shorter than width of vertex; 2 three and a half times longer than 1, its apical half somewhat thickened; 3 and 4 filiform, 3 two-thirds the length of 2, 4 two-fifths as long as 3. Length, 4—4.8 mm.

Burnham Beeches and Hurst Green, England, June 22—August (*British Mus. Coll.*). Definitely recorded in this country only from Orono, Me., and Ithaca, N. Y. At Ithaca it occurred in numbers in June on the ox-eye daisy, *Chrysanthemum leucanthemum* L., the great majority of the females being brachypterous.

IV. PARTHENICUS Reuter, 1876, 84.

Small, elongate, subparallel, pubescent, subopaque species having the head slightly wider across eyes than apex of pronotum, its front declivent; base of vertex not margined; eyes oblong, coarsely granulated; beak reaching onto ventrals; antennæ about two-thirds the length of body, joint 1 slightly

passing tip of tylus, 2 four times as long as 1, 3 and 4 united slightly longer than 2, 4 half the length of 3; pronotum twice as wide at base as long, apex about two-thirds as wide as base, calli scarcely evident; elytra usually entire with sides subparallel, surpassing abdomen; females sometimes brachypterous, with body oval and elytra shorter than abdomen; hind femora thickened, saltatorial. Three of the ten known North American species occur in the eastern states.

KEY TO EASTERN SPECIES OF PARTHENICUS.

- a.* Upper surface thickly flecked with small dots.
- b.* Dots of upper surface brick-red; cuneus in great part reddish; membrane fuscous. 846. *PSALLIODES*.
- bb.* Dots of upper surface brown or fuscous; cuneus not reddish; membrane mostly white. 847. *VACCINI*.
- aa.* Upper surface without distinct dots; cuneus and corium tinged with reddish. 848. *JUNIPERI*.

846 (1198). *PARTHENICUS PSALLIODES* Reuter, 1876, 85.

Pale brownish-yellow thinly clothed with fine yellowish hairs; entire upper and lower surface thickly dotted with dull red, the dots aggregated on cuneus to cover most of its surface; membrane pale fuscous-hyaline, iridescent, veins reddish; legs greenish-yellow, dotted with red; apical half of hind femora fuscous with two reddish rings; tibial spines yellowish with red dots at base. Antennæ pale yellow, joint 1 and apex of 2 marked with reddish. Length, 2.8—3.3 mm.

Dunedin, Fla., Nov. 23—Dec. 6. Two macropterous specimens swept from huckleberry, another from beneath a chunk on margin of pond. Described from Texas; recorded elsewhere only from California.

847 (1199). *PARTHENICUS VACCINI* (Van Duzee), 1915, 117.

Macropterous form—Elongate, subparallel. Greenish-white, head, calli and scutellum tinged with brownish-yellow; pronotum, scutellum and elytra dotted with fuscous, the dots condensed on apical fourth of corium and near tip of cuneus; commissure with a brown line behind tip of clavus; membrane translucent white, veins pale brown, four brown spots on margin; femora straw-yellow, their apical half with brown spots, those on hind femora sometimes merging; under surface pale brownish-yellow, more or less tinged with fuscous. Antennæ straw-yellow, joint 1 whitish with a black dot on inner face, but slightly surpassing tylus; 2 with a few vague brown dots, slightly longer than 3, 4 subequal in length to 1. Head prolonged in front of eyes a distance equal to width of an eye. Elytra nearly twice the length of abdomen. Length, 2.7—3.5 mm. *Brachypterous form*—Oval; membrane abbreviated, scarcely reaching tip of abdomen. Length, 1.6 mm.

Dunedin, Fla., April 6; one brachypterous female swept from tall grasses near the margin of a pond; compared with allotype.

Ipswich, Mass., July 22 (*Van Duzee*). Recorded heretofore only from Massachusetts and Long Island, N. Y., where it occurs in July on cranberry, *Vaccinium macrocarpon* Ait. The white, scale-like pubescence, notable in fresh specimens, is easily eroded, leaving the surface polished.

848 (1214). *PARTHENICUS JUNIPERI* (Heidemann), 1905a, 49.

Elongate, sides subparallel. Pale green fading to greenish-yellow; above thickly clothed with short, suberect golden-yellow hairs, intermixed with longer brownish ones, these easily abraded; the dark ones often combined to form a small dark spot near basal angles of scutellum, and others on inner edge of cuneus at middle and base; head, apical third of corium, cuneus in great part and under surface of hind femora more or less tinged with reddish; scutellum and often the base of clavus pale fuscous; membrane dusky translucent, somewhat iridescent, the veins white; legs greenish-yellow; under surface of body and upper side of hind femora usually pale dusky brown. Head shorter and more nearly vertical than in *vaccini*. Length, 2.7—3 mm.

Putnam Co., Ind., July 4—Oct. 1. Dunedin, Fla., Feb. 14—April 1; recorded also from Crescent City, that State. Beaten in numbers in autumn from its host plant, the red cedar, *Juniperus virginiana* L. One Dunedin specimen was taken in February from beneath a log. The known range extends from Ontario and New England west to Indiana, and southwest to Florida, its distribution being probably much more extensive than the records show.

Tribe IV. PILOPHORINI Kirkaldy, 1906, 132.

To this tribe, as characterized in the key, p. 796, belong four of our eastern genera of the subfamily.

KEY TO EASTERN GENERA OF TRIBE PILOPHORINI.

- a. Basal half of vertex compressed to a thin edge, which slightly overlaps the apex of pronotum; first antennal not longer than width of vertex; hind tibiæ of males usually compressed.
- b. Joint 2 of antennæ thickened toward apex; width of head less than width of pronotum at base.
- c. Elytra constricted or coarctate at middle and bearing white pubescent bands. I. PILOPHORUS, p. 807.
- cc. Elytra with sides subparallel and without white pubescent bands or cross-bars. II. ALEPIDIELLA, p. 817.
- bb. Joint 2 of antennæ scarcely thickened toward apex; width of head across eyes greater than width of pronotum at base; elytra with sides parallel and usually without white pubescent bands.

III. ALEPIDIA, p. 817.

- aa. Base of vertex not compressed; length of first antennal subequal to

width of head across eyes; hind tibiæ cylindrical; front half of pronotum subcylindrical, its sides subparallel.

IV. PSEUDOXENETUS, p. 818.

I. PILOPHORUS Hahn, 1826, 23.

Elongate, subcylindrical, sparsely pubescent species having the head broadly triangular, declivent, compressed behind, tylus depressed and fused with the front, beak reaching or slightly surpassing middle coxæ; antennæ stout, about half the length of body, the joints variable as to species; pronotum subcampanulate, apex narrower than head across eyes, basal half convex, sides sinuate, often with a broad vague constriction at middle, calli obsolete; elytra entire, slightly surpassing abdomen, their sides broadly concave along the middle third; corium usually with a short bar composed of silvery-gray scales across basal third which reaches only to claval suture and a second bar of similar scales at apical third which is either entire or slightly interrupted on the commissure; clavus convex, strongly deflexed to corium, cuneus and membrane deflexed; hind legs with femora thickened, tibiæ more or less curved, tarsi with joint 3 longest, 2 slightly shorter than 1. Of the genus Uhler (1887a, 29) wrote:

"The genus *Philophorus* has such a different facies from our other known Capsidæ that it would seem to be recognizable at once by the shape and adjustment of the head alone. It is very broad and curves back beyond the sides of the swollen pronotum, sits close against it, is of a conical form, scooped out behind and below; there is a high carina connecting the eyes, and the face is very sloping anteriorly. The ant-like form of the body, especially in the nymph, together with its habit of rapidly coursing over the bark of trees, renders it liable to be mistaken for one of the small red or brown Formicidæ."

Nineteen nominal species of the genus occur in the eastern states.⁸⁴ For convenience of treatment they are divided into three groups.

KEY TO GROUPS OF EASTERN SPECIES OF PILOPHORUS.

- a. Elytra polished over the entire area behind the posterior silvery crossbar.
- b. Scutellum nearly flat or only moderately convex. Group I, p. 808.
- bb. Middle of scutellum strongly convex, almost conically produced upward. Group II, p. 813.
- aa. Elytra polished behind the posterior silvery cross-bar, but only on the outer area between the radial vein and margin. Group III, p. 815.

⁸⁴The *P. schwarzi* Reut. (1909, 74) was described from California and, according to Knight (Ms.), all eastern records are based on wrong identifications.

GROUP I.—PILOPHORUS.

KEY TO EASTERN SPECIES OF GROUP I, PILOPHORUS.

- a.* Corium with only one cross-bar of silvery scales present, this the usual posterior one; clavus with a wedge-shaped spot of bluish bloom on outer basal third; basal half of corium less than half the width of apical third; length, 6 mm. 849. BRIMLEYI.
- aa.* Corium with two cross-bars of silvery-gray scales, one subbasal, the other at apical third.
- b.* Elytra beset with numerous suberect short black bristle-like hairs, these best visible from the side.
- c.* Larger, length 5 or more mm.
- d.* Joint 3 of antennæ black or brown, nearly as thick as joint 1. 850. VANDUZEEI.
- dd.* Joint 3 of antennæ pale, the apical half fuscous, slender, scarcely thicker than joint 4. 851. UHLERI.
- cc.* Smaller, length 3 mm. 852. BUENOI.
- bb.* Elytra clothed only with fine recumbent pubescence, this sometimes black, but not suberect and bristle-like.
- e.* Elytra yellowish-brown to dark brown, except behind posterior silvery line.
- f.* Joint 3 of antennæ pale, scarcely infuscated at apex; hind tibiæ strongly compressed, almost carinate.
- g.* Second antennal nearly four times as long as width of vertex; length of body, 5—5.2 mm. 853. STROBICOLA.
- gg.* Second antennal three times as long as width of vertex; length of body 3.8—4.2 mm. 854. PICEICOLA.
- ff.* Joint 3 of antennæ reddish-brown to piceous; hind tibiæ only slightly compressed. 855. CINNAMOPTERUS.
- ee.* Elytra bright cinnamon fulvous, except behind the posterior silvery line.
- h.* Larger, length 4.5 or more mm.; posterior silvery line not interrupted on corium but slightly projected forward on commissure; joint 2 of antennæ gradually thickened toward apex. 856. AMÆNUS.
- hh.* Smaller, length not more than 3.7 mm.; posterior silvery line interrupted on corium but not broken at claval suture.
- i.* Second antennal with apical third abruptly strongly clavate, its length greater than distance between tip of tylus and hind margin of pronotum. 857. LÆTUS.
- ii.* Second antennal gradually thickened from middle toward apex, its length not equal to distance between tip of tylus and base of pronotum. 858. JUNIPERI.

849 (—). PILOPHORUS BRIMLEYI Blatchley, 1926, 165.

Head, pronotum and scutellum dark blackish-brown, shining; clavus with inner basal third and apical half velvety-black, outer basal third with an inverse wedge-shaped spot covered with a bluish bloom, which extends back and broadens between the two velvety ones; corium without a trace of the usual sub-basal whitish cross-bar of the genus, the one on apical third present but short, not reaching claval suture and enclosed by a small bluish area; narrow basal half and a broad cross-bar

just behind the white one, velvety black, area behind the velvety bar and entire cuneus steel-gray; membrane dusky-translucent, the cells and a spot behind tip of cuneus darker; femora dark brown, shining; knees and tips of coxæ yellowish, tibiæ and tarsi pale brown; pleura dark brown, ventrals shining black. Joint 1 of antennæ brown, paler at base and tip, slightly shorter than width of vertex; 2 brownish-yellow, darker toward apex, gradually thickened from the base, four times as long as 1; 3 dull yellow, minutely pubescent, two-fifths as long as 2, 4 missing. Pronotum campanulate, basal portion strongly and evenly convex, little longer, but much wider and higher than front one, minutely granulate or subalutaceous. Scutellum small, moderately convex. Elytra strongly constricted, the basal half of corium less than half the width of apical third. Hind tibiæ, male, almost twice as long as femora, very slender, slightly flattened, feebly curved. Length, 6 mm.

Type, a male in the collection of the Division of Entomology, State Department of Agriculture, Raleigh, N. Car. Taken at Windsor, N. Car., July 7, 1925. Named in honor of C. S. Brimley, of Raleigh, who has furnished many specimens to aid my work on Heteroptera. It differs from all described forms of the genus in having but one whitish cross-bar on corium, in the form of the bluish bloom-covered spot on clavus, in the distinctly bell-shaped pronotum and very narrow basal half of corium.

850 (—). *PILOPHORUS VANDUZEEI* Knight, 1923, 540.

Head and pronotum blackish-brown, opaque, sparsely clothed with deciduous silvery hairs and erect bristle-like darker ones; scutellum shining black with similar silvery scales; basal two-thirds of elytra dark velvety-brown, the area behind posterior silvery bar, including cuneus, polished fuscous-brown; membrane dusky translucent with a darker lunate spot at apex of larger cell; under surface and femora dark fuscous-brown; tibiæ paler brown; front coxæ in part yellow. Joints 1—3 of antennæ reddish- to blackish-brown, 1 two-thirds the length of width of vertex; 2 five times as long as 1, gradually thickened from base to apex, much more so in female, 3 about two-fifths the length of 2, 4 pale, darker at tip, nearly as long as 3. Beak reaching onto middle coxæ. Pronotum with sides much less deeply sinuate than in *amænus* Uhl., the basal half of disk finely, transversely rugose-granulate. Scutellum with apical half and sides flattened, middle third with an obtuse tubercle. Hind tibiæ of male strongly flattened, distinctly curved. Length, 5—5.3 mm.

Lake County, Ind., July 14. Beaten from the gray pine, *Pinus divaricata* (Ait.). Lakehurst and Jamesburg, N. J.; Staten Island, N. Y., August (*Davis*). Recorded only from Massachusetts, New Jersey, Maryland and Washington, D. C. Occurs on the red pine, *Pinus resinosa* Ait. Distinguished by its dark color, erect black hairs of upper surface and feebly sinuate sides of pronotum. The *P. crassipes* Van Duzee (1918, 293) *new*. *Poppius* is a synonym.

851 (—). *PILOPHORUS UHLERI* Knight, 1923, 541.

Form and size of *vanduzeei*. Pronotum black, thinly clothed with suberect black hairs—but without silvery scale-like hairs. Elytra as in *vanduzeei*, the posterior silvery line distinctly broader; sides of ventrals 3—6 each with an oblique patch of silvery scale-like pubescence. Joints 1 and 2 of antennæ blackish-brown, 1 two-thirds as long as width of vertex, 2 four and two-third times as long as 1; 3 as in key, sometimes suffused with pink, nearly one-third as long as 2; 4 pale, dusky towards tip, one-tenth shorter than 3. Beak reaching tips of middle coxæ. Hind tibiæ feebly compressed, not distinctly flattened as in *vanduzeei*. Length, 5 mm.

Batavia, N. Y., July 14; Olivia, Minn., June 28 (*Minn. Univ. Coll.*). Recorded only from Ontario and New York. Breeds on the tamarack, *Larix laricina* (Du Roi), and the Scotch pine, *Pinus sylvestris* L.

852 (—). *PILOPHORUS BUENOI* Poppius, 1914, 243.

Brownish-yellow, clothed with short erect hairs; base of head, pronotum toward base and scutellum brownish-black; clavus, corium behind posterior cross-bar, cuneus and ventrals a deeper shining black; membrane black, not translucent. Joint 1 of antennæ yellow, about one-third shorter than eye; 2 reddish-yellow, feebly gradually thickened toward tip, three and a half times longer than 1. Head strongly inclined, narrower than basal margin of pronotum. Beak reaching middle coxæ. Pronotum about one-half shorter than wide at base, hind margin truncate, one-half wider than front one; sides rather strongly concave. Scutellum moderately convex. Elytra slightly constricted, surpassing abdomen. Length, 3 mm.

Described from Southern Pines, N. Car., and known only from there. Most closely related to *P. luctus*, but head narrower and longer, second antennal more gradually thickened and upper surface beset with short stiff hairs.

853 (—). *PILOPHORUS STROBICOLA* Knight, 1926b, 19.

Head and pronotum dark brown to blackish, clothed with fine silvery scale-like pubescence; scutellum chestnut-brown or black with a row of similar pubescence each side; basal two-thirds of elytra dull reddish-brown with the usual cross-bars of silvery pubescence, the hind one slightly interrupted at suture, the area behind it including cuneus, polished fuscous brown; membrane dusky translucent, faintly iridescent, the large cell in great part fuscous; legs reddish-brown; under surface dark chestnut-brown, shining, sides of ventrals 3—6 of male with an oblique patch of silvery-gray pubescence. Joint 1 of antennæ reddish-brown, four-fifths as long as width of vertex; 2 five times as long as 1, strongly clavate, more so in female, the apical third darkest; 3 yellowish-white, one third the length of 2; 4 pale fuscous, but little shorter than 3. Basal half of pronotum transversely rugose. Middle of scutellum elevated as an obtuse tubercle. Length, 5—5.2 mm.

Blowing Rock, N. Car., June 9 (*Brimley*). Clayton, Ga., June (*Davis*). Ranges from Quebec and New England west to Minnesota and southwest to Georgia. Breeds on the white pine, *Pinus strobus* L. The long, strongly clavate second antennal and pale third one, together with the strongly compressed hind tibiæ, distinguish this from its nearest allies. Poppius (1914, 243) described *P. crassipes* from Manitou, Colo., Riverton and Lakehurst, N. J., Washington, D. C., and Williams, Ariz. Knight (1923, 542) described the species he now calls *strobicola* under the name of Poppius, but later (1926b, 19) restricted the name *crassipes* to the western forms of Poppius and placed the eastern forms of that author under *vanduzeei* Knight.

854 (—). *PILOPHORUS PICEICOLA* Knight, 1926b, 19.

Color of *strobicola*. Basal portion of elytra yellowish-brown, clothed with recumbent black hairs and a few yellow scale-like ones. Posterior silvery bar straight, entire. Joints 1 and 2 of antennæ fusco-brownish, 1 three-fifths as long as width of vertex; 2 five times as long as 1, its apical half more strongly swollen than in *strobicola*; 3 white, darker at tip, one-third the length of 2; 4 pale, apical third fuscous, as long as 3. Length, 3.8—4.2 mm.

Known only from southern New York, where it was taken by Bueno in July from spruce.

855 (1129). *PILOPHORUS CINNAMOPTERUS* (Kirschbaum), 1855, 116.

Pale cinnamon-brown, sparsely clothed with very short yellowish-hairs; pronotum and scutellum black; area of corium behind posterior bar shining brown; cuneus brown with a small white pubescent spot at inner basal angle; membrane fuscous-brown, iridescent; legs brown, base of femora reddish-yellow; tarsi brownish-yellow, third joint and claws piceous. Joint 1 of antennæ brownish yellow, one half as long as width of vertex; 2 fuscous-brown, paler toward base, thickened toward apex, four and one-half times as long as 1; 3 black, base reddish, three-eighths as long as 2; 4 yellowish-white, apex brown, slightly shorter and more slender than 3. Beak reaching first ventral. Pronotum and scutellum finely transversely wrinkled, the latter with a crescent-shaped bar of white pubescence near tip. Length, 4 mm.

Herne Bay, England, August (*British Mus. Coll.*). A European species recorded in this country only by Osborn (1900, 12) from Ohio. Occurs in Europe on oaks and *Pinus sylvestris* L. Readily known from *strobicola* by the dark third antennal and small white spot on cuneus.

856 (1131). *PILOPHORUS AMÆNUS* Uhler, 1887a, 30.

Head and pronotum dark fuscous-brown, subopaque; scutellum dark brown, a small tuft of white hairs near apex and another each side of

base; basal two-thirds of elytra dull brownish-yellow with straight white cross-bar reaching claval suture at basal third of corium and another at apical third; area behind the latter fuscous-brown, shining; membrane a uniform dusky translucent; under surface piceous-brown, strongly shining, legs dark chestnut-brown. Joints 1 and 2 of antennæ dark reddish- or fuscous-brown, 1 half as long as width of vertex, 2 four and a half times as long as 1, 3 and 4 brownish-yellow, darker towards tips, 3 two-fifths the length of 2, 4 slightly shorter than 3. Pronotum with sides deeply sinuate, basal portion somewhat flaring with hind angles prominent, its disk finely scabrous. Scutellum with basal and apical areas flat, the former on a higher plane, the middle with an obtuse elongate tubercle. Elytra smooth. Hind tibiæ of male distinctly compressed. Length, 4.8—5.5 mm. (Fig. 179).

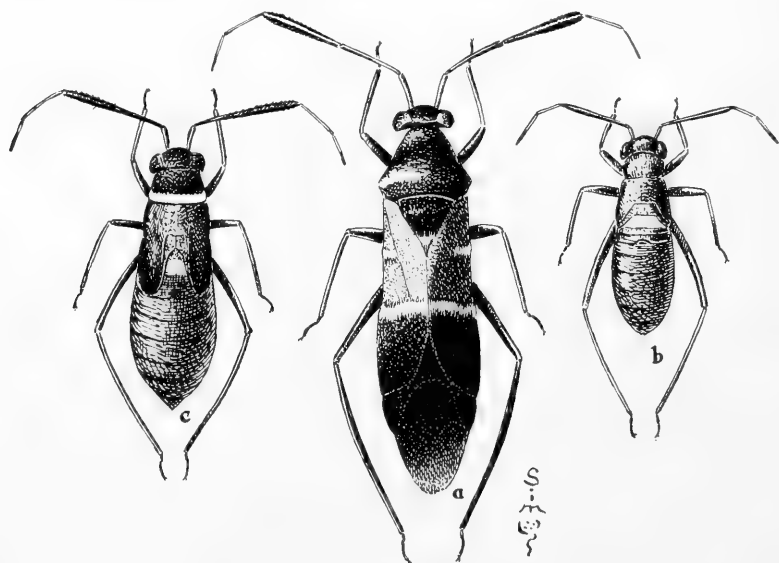


Fig. 179. *a*, Adult X 10; *b* & *c*, nymphs.
(After Drake, Tech. Publ. 16, N. Y. St. Coll. For.).

Floyd and Crawford counties, Ind., June 23; beaten from foliage of yellow pine, *Pinus echinata* Mill. The known range extends from Ontario and New England west to southern Indiana and southwest to Maryland. Recorded also from California and New Mexico. Drake (1923, 77) found it common about Cranberry Lake, N. Y., June to August, on yellow birch, beech, maple, white pine and herbaceous plants. Breeds on white pine.

857 (—). *PILOPHORUS LATUS* Van Duzee, 1918, 294.

Piceous, more or less castaneous, head, antennæ and legs paler; base of elytra bright cinnamon-brown, the apical area and posterior silvery line as in *ee* and *hh* of key; cuneus with a silvery point on inner basal

angle; front and hind coxæ and basal joint of tarsi whitish. Joint 1 of antennæ brownish; 2 five times as long as 1, pale at base, its clavate apical third blackish; 3 whitish, fuscous at tip, two-fifths the length of 2; 4 dusky, slightly longer than 3. Beak reaching hind coxæ. Elytra much wider toward apex. Length, 3.5—3.7 mm.

Recorded only from Washington, D. C., and Woodbine, N. J., where it occurs in June and August on *Pinus virginiana* Mill.

858 (—). *PILOPHORUS JUNIPERI* Knight, 1923, 543.

Dark brownish-back; elytra in front of posterior silvery line fulvous; membrane blackish toward base, pale fuscous apically and along sides of cuneus; legs fuscous brown; ventrals dark brown, shining, sides of segments 3—5 each with a patch of silvery hairs. Joint 1 of antennæ brown, three-fifths as long as width of vertex; 2 as in key, brown, apical half black, four times as long as 1; 3 pale, fuscous toward tip, two-fifths as long as 2; 4 fuscous, as long as 3. Beak reaching between middle coxæ. Length, 3.7 mm.

Gray Cloud, Minn., July 20 (*Minn. Univ. Coll.*). Ranges from New England west to Minnesota and south to New Jersey. Breeds on red cedar, *Juniperus virginiana* L.

GROUP II.—PILOPHORUS.

KEY TO EASTERN SPECIES OF GROUP II, PILOPHORUS.

- a. Elytra dark brownish-black with apex of clavus as well as corium polished behind posterior silvery line; front silvery line projected somewhat obliquely backward, nearly or quite reaching the hind one; length, 4.1 mm. 859. *FURVUS*.
- aa. Elytra cinnamon-brown to fulvous, only the polished apical area dark brown to piceous.
 - b. Second antennal subequal in length to width of vertex; length 3 mm.
 - c. Front half of head not conically produced; eyes not covering front angles of pronotum. 860. *HEIDEMANNI*.
 - cc. Front half of head conically produced; eyes strongly concave behind, so set as to completely cover front angles of pronotum. 861. *NASICUS*.
- bb. Second antennal almost equal to width of head across eyes; length 3.5 mm. 862. *DEPICTUS*.

859 (—). *PILOPHORUS FURVUS* Knight, 1923, 539.

Dark brownish-black; pronotum with side margins reddish-brown; basal angles and apex of scutellum with a tuft of silvery scale-like hairs; elytra as in key; cuneus piceous, polished and with a silvery spot near inner basal angle; membrane pale fuscous, apical half of cells and middle of disk opaque blackish; legs concolorous with elytra, tibiæ somewhat paler, trochanters, joints 1 and 2 of tarsi and apex of hind coxæ, pale; ventrals dark brown, shining, finely pubescent. Joints 1 and 2 of antennæ dark reddish-brown; 1 two-fifths as long as width of vertex, 2 four

times as long as 1; 3 more slender, basal half pale, apical half dark brown, two-fifths as long as 2. Beak not reaching middle coxæ. Mesoscutum broadly exposed. Length, 4.1 mm.

Known only from Lakehurst, N. J.

860 (—). *PILOPHORUS HEIDEMANNI* Poppius, 1914, 240.

General color brown; base of head, hind portion of pronotum and apical third of corium blackish-brown; scutellum, except tip, and remainder of elytra reddish-brown; posterior silvery cross-bar broken into three spots, the middle one the smaller; cuneus shining black, its inner basal angle with a small patch of white scales; membrane smoke-brown; ventrals and legs brown; coxæ and joints 1 and 2 of tarsi yellowish-white. Antennæ blackish-brown, joint 1 paler, not reaching tip of tylus; 2 gradually thickened from base to apex, not quite twice as long as 1. Beak reaching tips of middle coxæ. Pronotum about one-half shorter than wide at base, hind margin concave, almost twice as wide as front one. Scutellum strongly convex, only its tip flat. Elytra in both sexes slightly surpassing abdomen. Length, 3—3.2 mm.

Recorded only from Virginia and West Virginia, where it was taken by Heidemann in August and September.

861 (—). *PILOPHORUS NASICUS* Knight, 1926b, 18.

Head and pronotum fuscous-black; elytra yellowish-brown; cuneus, apical area of corium and embolium dark fuscous-brown, shining, cuneus with a tuft of silvery scales on inner basal angle; silvery cross-bars of elytra interrupted, the hind one composed of four tufts of silvery hairs set on dark brown spots; membrane and veins fuscous-brown; legs yellowish-brown; ventrals dark brown, the two basal ones paler. Joint 1 of antennæ two-thirds as long as width of vertex; 3 and 4 brownish-black, pale at base, 4 slightly shorter than 3. Scutellum rather strongly convex with tufts of silvery scales on basal angles and apex. Length, 2.9 mm.

Known only by a single male taken by Davis in November at Newberry, Fla.

862 (—). *PILOPHORUS DEPICTUS* Knight, 1923, 539.

Head and pronotum brownish-black; scutellum and membrane as in *furvus*; elytra as in *aa* of key, the posterior silvery cross-bar twice interrupted; entire area behind it, including cuneus, piceous, polished; legs brownish-black, trochanters and apical half of hind coxæ, white. Joint 1 of antennæ brownish, slightly less than one-half as long as width of vertex; 2 black, brownish at base, four times as long as 1; 3 and 4 fuscous, paler at base, 3 two-fifths as long as 2, 4 slightly shorter. Beak reaching between middle coxæ. Apical half of elytra flaring, widest at cuneal fracture. Length, 3.5 mm.

Known only by a single female taken near Washington, D. C., and now in the Cornell University collection.

GROUP III.—PILOPHORUS.

KEY TO EASTERN SPECIES OF GROUP III, PILOPHORUS.

- a. Posterior transverse silvery line of clavus and corium nearly straight, bent slightly forward on commissure. 863. PERPLEXUS.
- aa. Posterior transverse silvery line of clavus and corium dislocated and projected forward on commissure.
 - b. Joint 2 of antennæ shorter than the distance between tip of tylus and basal margin of pronotum; smaller, length not exceeding 3.5 mm.
 - c. Beak scarcely reaching hind margin of mesosternum; inner portion of posterior silvery band not projected forward to form a transverse line with that on clavus. 864. WALSHII.
 - cc. Beak reaching middle of hind coxæ; inner portion of interrupted posterior silvery band projected forward and forming a transverse line with that on clavus. 865. GEMINUS.
- bb. Joint 2 of antennæ as long as or longer than distance between tip of tylus and basal margin of pronotum; larger, length 4 or more mm.
 - d. Clavus of the same brown color as corium; joint 2 of antennæ subequal in length to distance between tip of tylus and base of pronotum. 866. BRUNNEUS.
- dd. Clavus distinctly darker bordering scutellum and commissure; joint 2 of antennæ distinctly longer than distance between tip of tylus and base of pronotum. 867. CLAVATUS.

863 (—). PILOPHORUS PERPLEXUS Douglas & Scott, 1875, 101.

Head, pronotum and scutellum fuscous-brown to blackish; elytra uniformly dark brown clothed with minute yellow pubescence, the posterior silvery cross-bar as in key; membrane uniformly dark fuscous, feebly iridescent. Joint 1 of antennæ brownish, only one-third as long as width of vertex; 2 brown, darker toward apex, nearly five times as long as 1; 3 and 4 fuscous, paler toward base, 3 two-fifths as long as 2, male, four-fifths as long as 2, female; 4 slightly shorter than 3, male, one-half the length of 3, female. Scutellum with a short white pubescent stripe each side of base. Length, 4 mm.

Hollington and Woodstreet, England, August (*British Mus. Coll.*). A European species recorded in this country from Nova Scotia and New York. Occurs on goldenrod.

864 (1132). PILOPHORUS WALSHI Uhler, 1887a, 30.

Head in great part dull reddish-yellow, the base of vertex fuscous; pronotum fuscous-brown, subopaque; scutellum dark brown, shining, with a row of silvery scales each side; elytra dull yellowish, sometimes darker, with two narrow silvery bands as in *amænus*, the hind one projected slightly forward on claval commissure, the inner half of the area behind it of the same hue, the outer half and cuneus a polished fuscous-brown; inner basal angle of cuneus with a silvery spot; membrane dusky; legs and under surface in great part dull reddish-yellow, coxæ paler; hind

femora, last three ventrals and tarsi tinged with fuscous. Antennæ with joint 1 and basal three-fourths of 2 reddish-brown, apical fourth of 2 fuscous; 1 three-fifths as long as width of vertex, 2 four times as long as 1; 3 and 4 dusky, 3 paler at base, one-third longer than 4. Pronotum shorter, with sides less sinuate, than in *amænus*. Length, 3.3—3.5 mm.

Lake and Marion counties, Ind., June 11—July 15; frequent on honey locust (*H. S. B.*). Palos Park and Willow Springs, Ill., May 31—June 28 (*Gerhard*). Recorded from New York west to Iowa, Missouri and Colorado.

865 (—). *PILOPHORUS GEMINUS* Knight, 1926b, 22.

Head and pronotum brownish-black, cheeks and loræ more yellowish; elytra pale cinnamon-yellow, base and apex of clavus, outer half of corium, cuneus and apex of embolium, dull blackish; posterior silvery bar interrupted, its inner portion set forward as in key; membrane fuscous, cells and veins yellowish; legs yellowish-brown, coxæ paler, hind tibiæ fuscous. Joint 1 of antennæ yellowish, half as long as width of vertex; 2 dusky yellow, cylindrical, four times as long as 1; 3 blackish, pale at base, two-fifths the length of 2, 4 black, almost as long as 3. Length, 3.2 mm.

Known only from Minnesota and Wonewac, Wis.

866 (—). *PILOPHORUS BRUNNEUS* Poppius, 1914, 244.

Form of *walshi* but slightly larger. Color darker, vertex and pronotum fuscous-black; basal two-thirds of elytra dark brown; middle of posterior silvery line projected slightly forward, outer half of area behind it and cuneus polished fuscous; membrane dusky translucent; under surface fuscous-brown, shining; legs reddish-brown, the coxæ pale yellow. Joint 1 of antennæ half as long as width of vertex, 2 dark brown, blackish at tip, five times as long as 1, 3 and 4 fuscous, paler at base, 4 three-fourths the length of 3. Length, 4 mm.

Lake and Marion counties, Ind., June 19—Sept. 24; beaten from willow. Recorded only from New York.

867 (1128). *PILOPHORUS CLAVATUS* (Linnæus), 1767, 729.

Elongate, robust for the genus, subdepressed above. Vertex, pronotum and scutellum fuscous-black, subopaque; inner half of clavus fuscous-brown, outer half of clavus and basal two-thirds of elytra dark reddish-brown thinly clothed with short yellowish hairs and with the usual silvery lines, the hind one interrupted on suture; cuneus and outer half of corium adjoining polished fuscous-brown; membrane with a rounded reddish-brown spot at middle, the apical half paler; legs reddish-brown, hind femora tinged with fuscous, all the coxæ in great part dull yellow; under surface fuscous-brown, the sides of ventrals 2—4 with an oblique bar of silvery-gray scales. Joint 1 of antennæ reddish-brown, one-half as long as width of vertex; 2 reddish-brown with apex darker, gradually feebly thickened from the base, five times as long as 1; 3 with basal half reddish-yellow, apical half blackish, two-fifths the length of 2; 4 fus-

cous, three-fifths as long as 3. Pronotum with sides less deeply sinuate than in *amænus*, the base about one-half wider than apex. Scutellum with an obtuse median tubercle. Length, 4.5—5 mm.

Cary, Ill., Aug. 27, on oak (*Gerhard*). Oliverea, N. Y., June (*Davis*). A European species, recorded in this country from Ontario, Massachusetts, New York, Minnesota and North Dakota. In Europe it occurs on willows, alders and birches.

II. ALEPIDIELLA Poppius, 1914, 252.

Differs from *Pilophorus* and *Alepidia* mainly by the characters given in generic key. Head strongly inclined, wider than long; vertex almost flat, margined behind; beak reaching middle coxæ; pronotum wider at base than long, base one-third wider than apex, hind margin broadly concave; mesoscutum widely exposed; elytra surpassing abdomen, cuneus wider than long, strongly deflexed; hind tibiæ compressed, slightly curved; joints 1 and 2 of hind tarsi subequal, united about as long as 3. One species is known.

868 (—). ALEPIDIELLA HEIDEMANNI Poppius, 1914, 253.

Blackish-brown; front of head brown; elytra brownish-yellow, tip of clavus and inner apical half of corium darker; outer apical angle of corium and outer margin and tip of cuneus blackish; membrane brownish-yellow, a dark spot at center; ventrals dark brown. Joint 1 of antennæ yellow, seen from the side one-third shorter than eye; 2 blackish-brown, four times longer than 1. Length, 3.5 mm.

Originally described from a single male taken at Washington, D. C., July 18 by McAtee. Not known elsewhere.

III. ALEPIDIA Reuter, 1909, 75.

"Closely related to *Pilophorus*. Differs in having the second joint of antennæ more slender, scarcely swollen near apex; elytra with sides parallel, not coarctate at middle, destitute of a whitish pubescent fascia and cuneus nearly horizontal." (*Reuter*). One species is known.

869 (1133). ALEPIDIA GRACILIS (Uhler), 1895, 42.

Elongate, subparallel, subdepressed above. Head, pronotum and scutellum fuscous-black, feebly shining; elytra dark fuscous-brown, embolium and basal fourth of corium dull yellow; membrane dusky translucent with usually a darker spot at middle of larger cell; legs greenish-yellow; under surface black, strongly shining. Joints 1 and 2 of antennæ dull yellow, 1 one-half as long as width of vertex; 2 slightly longer than pronotum, its apex often darker; 3 and 4 fuscous, filiform, 3 one-

half as long as 2, 4 two-thirds the length of 3. Beak reaching middle coxæ. Eyes very large, flattened behind, overlapping front angles of pronotum. Pronotum feebly narrowed from base to apex, disk finely wrinkled, hind angles obtusely rounded. Length, 3.8—4.2 mm.

Lake and Marion counties, Ind., July 14—Aug. 15. Kissimmee, Fla., Feb. 16; this the only record for that State (*W. S. B.*). Jamesburg, N. J., July 2 (*Davis*). Described from Colorado. Occurs in the east from Massachusetts and New York to Virginia, Florida and Alabama. Breeds on the scrub and red pines. Knight (1926b, 26) has described as var. *squamosa*, a form having several small patches of silvery pubescence on the elytra and includes among his paratypes part of the Indiana and Florida specimens above mentioned.

IV. PSEUDOXENETUS Reuter, 1909, 66.

Elongate, slender-bodied glabrous species having the head feebly exserted, wider across eyes than apex of pronotum, its front declivent; eyes large, elongate-oval; beak reaching middle coxæ; antennæ slender, three-fourths the length of body, joint 1 longer than head, 2 feebly thickened toward apex, three times as long as 1, 3 and 4 much more slender, united slightly shorter than 2; pronotum campanulate, apical portion subcylindrical, basal portion convex, much wider, humeral angles subacute, hind margin broadly concave, leaving the convex mesoscutum widely exposed; elytra entire, surpassing tip of abdomen, feebly broadly constricted at middle, commissure twice the length of scutellum, cuneus elongate-triangular, feebly deflexed; joints 1 and 2 of hind tarsi subequal in length, 3 about as long as the others united. Two species are known.

KEY TO SPECIES OF PSEUDOXENETUS.

- a. Apical half or more of scutellum yellowish-white, remainder black; pronotum and pro- and mesosterna black or dark brown.

870. SCUTELLATUS.

- aa. Apical half or more of scutellum black, remainder reddish; basal half of pronotum and pro- and mesosterna reddish.

871. REGALIS.

870 (1160). PSEUDOXENETUS SCUTELLATUS (Uhler), 1890, 81.

Elongate, subcylindrical. Color somewhat variable; head and pronotum usually black, shining; elytra fuscous-black or dark brown, subopaque; apical half or more of scutellum and a bar across base of cuneus yellowish-white, remainder of cuneus piceous, shining, membrane dark fuscous; joint 1 of antennæ brownish above, yellowish beneath, 2 dark brown, 3 and 4 dusky white; legs fuscous-brown, front and middle tibiae

paler; under surface piceous, shining. Head minutely granulate, vertex with a narrow impressed longitudinal line. Basal half of pronotum vaguely transversely rugose. Mesoscutum strongly convex, smooth, shining. Elytra almost smooth. Length, 6.5—7.5 mm.

Scarce throughout Indiana, May 12—July 11; beaten from oak and swept from herbage along margins of woodland. Ranges from Ontario and New England west to Michigan and Illinois and southwest to North Carolina. The records of its occurrence are remarkably few, taking into consideration its rather wide distribution, peculiar form and coloration. Breeds on the yellow and white oaks, *Quercus muhlenbergia* Engl. and *Q. alba* L., and occasionally on ash. In teneral specimens the general color is brownish with basal half of pronotum sometimes reddish as in *regalis*, but scutellum always in part whitish.

871 (1159). PSEUDOXENETUS REGALIS (Uhler), 1890, 80.

Differs from *scutellatus* mainly by the characters given in key, the basal half of pronotum and the mesoscutum being reddish or reddish-yellow, as are also the pro- and mesosterna and sometimes the lower part of head; white bar at base of cuneus more often wanting; antennæ blackish to fuscous, basal half of joint 3 pale; legs piceous-brown, the tibiæ somewhat paler. Length, 7—7.5 mm.

Sarasota and Dunedin, Fla., Jan. 28—April 1; beaten from its host plant, the live oak, *Quercus virginiana* Mill., recorded also from Bellaire and Jacksonville, Fla. Long Island, N. Y., June 20 (Davis). Ranges from New York and central Illinois, southwest to Florida and Texas. Uhler mentions it as occurring in Pennsylvania on the white-heart hickory, *Hicoria alba* (L.). It is very probable that a large series from all parts of the country will show that this and the preceding are but color forms of the same species, in which case the name *regalis* will have precedence, and our more common northern form will be known as *P. regalis scutellatus* (Uhl.). The Davis specimen, identified by Knight as *regalis*, has the apical half of scutellum white, basal half of pronotum red.

Tribe V. CERATOCAPSINI Van Duzee, 1916a, 211.

To this tribe, as characterized in the key, p. 796, belong two of our eastern genera.

KEY TO GENERA OF TRIBE CERATOCAPSINI.

- a. Pronotum with front portion subcylindrical, rather abruptly flaring behind middle, basal half of disk strongly convex; embolar margins sinuate on basal half. I. PAMILLIA.

- aa. Pronotum subtrapezoidal, its sides nearly straight and gradually converging from base to apex, not constricted at middle; embolar margins not sinuate. II. CERATOCAPSUS.⁸⁵

I. PAMILLIA Uhler, 1887a, 31.

Differs from *Pilophorus* in having the head longer and more convex, front more nearly vertical; antennæ much stouter, of nearly equal thickness throughout, joint 1 three-fifths as long as width of vertex, 2 longer than pronotum, four times the length of 1, 3 and 4 subequal, united one-fifth longer than 2; pronotum as in key, calli wanting; elytra widened behind the middle, outer margin of corium broadly curved; cuneus broader at base than long, strongly deflected, the fracture deep; arolia free, converging apically. Two species are known, one occurring in our territory.

872 (—). PAMILLIA DAVISI Knight, 1923, 535.

Elongate, widened behind middle. Dark reddish-brown, finely pubescent; joints 1 and 2 of antennæ brownish-yellow, 3 and 4 dark brown, thickly clothed with fine short yellow hairs; basal half of clavus paler brown, both it and corium sparsely beset with short erect black bristles; corium with a pale brown pruinose band across middle and a strongly shining area on apical third; basal half of embolium amber-brown, translucent; membrane brownish-black, paler towards tip; legs reddish-brown, trochanters and tips of coxæ paler; ventrals dark brown, strongly shining, the third pruinose. Front of head and vertex alutaceous. Beak reaching between middle coxæ. Scutellum transversely rugose, apical third opaque. Length, 3.8 mm.

Recorded only from Manumuskine and Lakehurst, N. J., where it was taken in September by Davis.

II. CERATOCAPSUS Reuter, 1876, 87.

Oblong-oval, feebly shining species having the head inserted in thorax to eyes, wider across eyes than apex of pronotum, its front declivent; vertex with a median longitudinal impressed line; beak slender, reaching or surpassing middle coxæ; antennæ stout, shorter than body, joints 2 and 3 of nearly equal thickness, 3 usually stouter than 4, the relative length of all joints variable as to species; eyes prominent, more so in male, coarsely granulated; pronotum as in generic key, trapezoidal,

⁸⁵The principal characters separating *Tirysus* (*Trichia*) Reut. from *Ceratocapsus* Reut., as set forth by Reuter (1876) and Van Duzee (1916a, 212) hold good of the males only. Of the two species included under *Tirysus* by Van Duzee (1917, 38) one, *punctulatus*, is herewith included under *Ceratocapsus*. The other, *T. elongatus* (Uhler), was described from Colorado and California and mentioned by him, probably in error, as occurring in Florida. No other record of its occurrence in that State can be found and it is not, therefore, treated in this work.

without apical constriction, calli vague or wanting, basal half convex, declivent forward, base twice or more the width of apex, hind margin truncate, covering mesoscutum; elytra entire, male, sometimes brachypterous, female, clavus strongly declivent toward corium, cuneus and membrane subhorizontal, the fracture weak; basal joint of hind tarsi shortest, 3 nearly as long as 1 and 2 united. Nineteen species are recorded or known from the eastern states. For convenience these are separated into two groups.

KEY TO GROUPS OF EASTERN SPECIES OF CERATOCAPSUS.

- a.* Pronotum not or indistinctly punctate, often more or less alutaceous.
Group I, p. 821.
- aa.* Pronotum punctate, sometimes finely yet always distinctly so.
Group II, p. 826.

GROUP I.—CERATOCAPSUS.

KEY TO EASTERN SPECIES OF GROUP I, CERATOCAPSUS.

- a.* Upper surface clothed only with simple pubescence, this sometimes in the form of long pilose hairs.
- b.* Head in great part and third and fourth antennals red; pronotum and elytra uniform pale yellowish; length, 4.5 mm.
873. LUTESCENS.
- bb.* Head and antennæ not distinctly red; upper surface more or less darkened.
- c.* Upper surface dark brown; elytra with a broad yellowish cross-bar just behind apex of scutellum.
874. FASCIATUS.
- cc.* Elytra without a pale cross-bar.
- d.* Beak reaching hind coxæ; length more than 3.5 mm.
- e.* Head and pronotum not or scarcely darker than elytra.
- f.* General color brownish-yellow to fuscous, basal half of elytra frequently paler; cuneus brown or fuscous; form robust; length, 4.3 mm.
875. MODESTUS.
- ff.* General color chestnut-brown, shining; cuneus red; form slender; length, 3.6 mm.
876. ADVENUS.
- ee.* Head and pronotum shining, black; elytra yellowish with fuscous cloud on corium; form slender; length, 4.5 mm.
877. NIGROCEPHALUS.
- dd.* Beak not reaching middle coxæ; length not more than 3 mm.
878. MINUTUS.
- aa.* Upper surface with appressed silky pubescence, usually mixed with more erect pubescent hairs.
- g.* Elytra dark brown with a pale cross-bar behind tip of scutellum.
879. PILOSUS.
- gg.* Elytra without a pale cross-bar.
- h.* Upper surface clothed with prominent long erect pilose hairs; dark brownish-black, legs and joints 1 and 2 of antennæ yellowish; length, 4.1 mm.
880. SERICUS.

hh. Upper surface sparsely clothed with fine short pubescence, sometimes with a few scattering long hairs on scutellum and elytra.

i. Third antennal not as long as width of vertex plus dorsal width of an eye; upper surface uniformly yellowish. 881. LUTEUS.

ii. Third antennal longer than width of vertex plus dorsal width of an eye.

j. Pronotum reddish; basal half of elytra paler than apical half; legs yellowish; third antennal shorter than width of head across eyes; length, 3.4 mm. 882. VICINUS.

jj. Pronotum blackish; elytra fuscous-brown with a small pale elongate area at basal angles of corium and embolium; legs brownish-yellow to dark reddish-brown; third antennal subequal in length to width of head; length, 4.4—4.7 mm.

883. NIGELLUS.

873 (1137). CERATOCAPSUS LUTESCENS Reuter, 1876, 87.

Oblong-oval. Color above and below a uniform pale straw-yellow, shining; head, and often the front margin and a line behind front angles of pronotum, joints 3 and 4 and apex of joint 2 of antennæ, blood-red. Joint 1 of antennæ subequal in length to width of vertex, 2 nearly four times as long as 1, 3 two-fifths the length of 2, 4 one-fourth shorter than 3. Length, 4.3—4.5 mm.

Dunedin, Fla., April 11—23; swept from ferns in dense wet hammocks and taken at porch light. Recorded from Long Island, N. Y., Estero and Sevenoaks, Fla., Kansas and Texas. Van Duzee took it at Estero from "low bushes of a broad leaved oak."

874 (1142). CERATOCAPSUS FASCIATUS (Uhler), 1877, 421.

Pale to dark reddish-brown, thickly clothed with very fine prostrate yellowish hairs; elytra with a broad pale yellow bar crossing their entire width just behind scutellum; embolium pale yellow, cuneus tinged with reddish; membrane pale translucent; antennæ and legs pale reddish to straw-yellow, densely finely pubescent; under surface reddish-brown shining, genital region darker, ventrals thinly clothed with long prostrate yellow hairs. Beak reaching hind coxæ. Antennæ stout, two-thirds the length of body, joint 1 two-thirds as long as width of vertex; 2 visibly thickened from base to apex, three times as long as 1; 3 and 4 as thick as apex of 2, 3 one-half the length of 2, 4 fusiform, two-thirds as long as 3. Pronotum, scutellum and elytra densely minutely scabrous or shagreened. Length, 2.8—3.2 mm.

Staten Island, N. Y., July 8 (Davis). Ranges from Ontario and New England west to Colorado and Kansas. Doubtless to be found in Indiana. Occurs on alder and hickory.

875 (1138). CERATOCAPSUS MODESTUS (Uhler), 1887b, 69.

Elongate-oval. Dull brownish-yellow, very finely and sparsely clothed with yellowish pubescence; pronotum, scutellum and apical half

of elytra, including cuneus, usually more or less tinged with fuscous, sometimes almost wholly fuscous-black; cuneus and apex of embolium in pale specimens sometimes tinged with reddish; membrane pale dusky translucent; under surface and front and middle legs greenish-yellow; ventrals and hind legs usually darker; tibial spinules blackish. Antennæ reddish-brown, joints 3 and 4 minutely hirsute, apex of 2 often somewhat darker; joint 1 one-third longer than width of vertex; 2 feebly thickened from base to apex, three times longer than 1; 3 nearly half as long and almost as thick as 2; 4 subfusiform, three-fourths the length of 3. Upper surface minutely alutaceous, otherwise almost smooth. Beak reaching hind coxæ. Length, 4.3—4.6 mm.

Frequent throughout Indiana, June 3—July 28; beaten from hickory and wild grape. Dunedin, Fla., March 18, at porch light; the first record for that State. Ranges from Ontario and New England west to South Dakota and Vancouver, and southwest to Florida and Kansas. Recorded also from New Mexico and Grenada. Uhler states that in Maryland it is often common on pine in June and July. He also mentions the pronotum as being "coarsely unevenly punctate," which is not true of the specimens at hand determined by Knight. It is probably in part predaceous, as Van Duzee says that about Buffalo it: "Is not uncommon on pines and a few other trees when infested with aphids."

876 (—). CERATOCAPSUS ADVENUS sp. nov.

Male—Elongate, slender, sides subparallel. Chestnut-brown, shining, very sparsely clothed with minute pale scale-like hairs and a few scattered longer ones; deflexed basal margin of pronotum, inner edge of clavus and commissure a little paler; cuneus red, its inner basal angle and apical fifth of corium slightly darker; membrane fuscous, base and an elongate spot bordering inner margin of cuneus, yellowish; legs and under surface dark reddish-brown, shining. Joints 1 and 2 of antennæ reddish-brown; 1 as long as width of vertex, 2 three and one-fourth times longer than 1; 3 and 4 fuscous-brown, almost as thick, and united two-thirds as long as 2; 4 fusiform, three-fifths the length of 3. Eyes large, prominent, wider than vertex. Pronotum without evident punctures. Elytra minutely sparsely punctate; surpassing abdomen by three-fourths the length of membrane. Length, 3.6 mm.

Dunedin, Fla., April 9; beaten from limbs of a recently felled pine. Crescent City, Fla. (*Van Duzee*). Evidently allied to *nigrocephalus* Knight, but easily distinguished by the characters given in key.

877 (—). CERATOCAPSUS NIGROCEPHALUS Knight, 1923, 534.

Elongate, slender, subparallel. Color as in key; sparsely clothed with suberect hairs; scutellum black; elytra yellowish translucent, base

of cuneus and apical half of corium usually heavily tinged with fuscous; membrane pale at base, apical half and central area between cells fuscous-hyaline; legs pale yellowish-brown, front coxæ reddish to piceous; ventrals reddish-brown to blackish, shining, clothed with yellowish hairs. Joint 1 of antennæ yellowish, fuscous at base, one-fifth longer than width of vertex; 2 yellowish, darker toward apex, four times as long as 1; 3 and 4 fuscous, 3 three-fifths as long as 2, 4 one-half the length of 3. Beak reaching middle of hind coxæ. Pronotum vaguely alutaceous, side margins slightly sinuate, calli evident but vague. Scutellum finely transversely rugose. Length, 4.5—5 mm.

St. Anthony Park, Minn., July 5—6, taken at light (*Minn. Univ. Coll.*). A species of northern distribution ranging from Quebec and New England west to South Dakota.

878 (1141). CERATOCAPSUS MINUTUS (Uhler), 1893, 713.

Head pale yellow, middle of front piceous, tylus dusky; pronotum, scutellum and elytra dark brown, strongly shining, clothed with minute golden pubescence; embolium pale yellow, notch and inner margin of cuneus pale; membrane dusky, paler at base; legs ivory-white; ventrals chestnut brown, shining, genital region paler. Joints 1 and 2 of antennæ brown; 2 paler at base, as long as pronotum plus the width of an eye; 3 and 4 more slender, pale yellow, of equal thickness throughout. Head with vertex wider than apex of pronotum, highly polished. Pronotum and elytra obsoletely punctate, the former with side margins slightly sinuate. Length, 2.5—3 mm.

Described from St. Vincent. Recorded by Van Duzee (1917, 382) from Florida and Kansas, without definite station or citation to the Florida record.

879 (—). CERATOCAPSUS PILOSUS Knight, 1923, 526.

Dark reddish or chestnut-brown, with pubescence as in key; a broad cross-bar across middle of elytra and a small spot opposite base of cuneus dull yellow; membrane dusky, yellowish at base; front and middle legs, base of hind femora and ventrals 1—3 greenish-yellow; remainder of hind legs and under surface chestnut-brown. Antennæ with joint 1 and basal half of 2 yellowish, remainder reddish-brown, finely pubescent; 1 four-fifths the length of width of vertex, 2 three and two-thirds times the length of 1, 3 two-thirds the length of 2, 4 three-fourths as long as 3. Beak reaching first ventral. Head and pronotum shining, without evident punctures. Scutellum minutely transversely strigose. Elytra very finely shallowly punctate. Length, 3.4—3.6 mm.

Lake Co., Ind., June 30 (*W. S. B.*). Pentwater, Mich., and Willow Springs, Ill., July 8—26 (*Gerhard*). Recorded only from Massachusetts and Minnesota, where it was taken on hop-hornbeam, *Ostrya virginiana* (Mill.) and bur oak, *Quercus macrocarpa* Michx. Apparently differs from *C. fasciatus* only in the character of the pubescence.

880 (—). *CERATOCAPSUS SERICUS* Knight, 1923, 530.

Color and pubescence of upper surface as in key; scutellum, clavus and basal half of corium clothed also with appressed silvery scale-like pubescence; embolium subtranslucent; membrane and veins uniformly pale fuscous with a small pale spot opposite tip of cuneus; legs dull yellow, ventrals dark brownish-black, the genital region with yellowish hairs. Joints 1 and 2 of antennæ yellowish, 1 slightly longer than width of vertex, 2 three and one-half times as long as 1; 3 and 4 dark reddish-brown, 3 one-half the length of 2, 4 three-fourths as long as 3. Beak reaching upon hind coxæ. Head brownish, coarsely alutaceous. Pronotum with side margins slightly sinuate. Scutellum transversely rugulose. Length, 4 mm.

Recorded only from New York, New Jersey and Michigan.

881 (—). *CERATOCAPSUS LUTEUS* Knight, 1923, 527.

Uniform dull yellow, elytra somewhat translucent; membrane pale tinged with dusky, veins yellowish. Joint 1 of antennæ slightly shorter than width of vertex, female, slightly longer, male; 2 three and two-third times the length of 1, slender at base, thicker and somewhat dusky toward apex; 3 dusky yellow, almost half as long as 2; 4 brownish, as thick as 3, one-fifth shorter. Beak reaching hind margins of middle coxæ. Pronotum impunctate, vaguely alutaceous, sides straight. Length, 3.8—4 mm.

Recorded from New York and West Virginia. Resembles *lutescens*, but smaller, head yellow, not red, and pubescence different.

882 (—). *CERATOCAPSUS VICINUS* Knight, 1923, 529.

Head and pronotum tawny- to reddish-yellow; scutellum and apical half of corium dark brown; clavus and basal half of corium yellowish, thickly clothed with appressed silvery scale-like hairs; membrane pale, fuscous toward apex; legs dull yellow; ventrals dark reddish-brown to blackish, shining; genital segment with long yellowish hairs. Joints 1 and 2 of antennæ dull yellow, 1 as long as width of vertex, 2 four times as long as 1; 3 and 4 reddish-brown, 3 slightly more than one-half the length of 2, 4 three-fourths as long as 3. Beak reaching between hind coxæ. Pronotum with side margins straight, calli evident but vague, disk finely alutaceous. Length, 3.4—3.6 mm.

Known only from New York and New Jersey.

883 (—). *CERATOCAPSUS NIGELLUS* Knight, 1923, 528.

Color as in key; scutellum and basal half of elytra with closely appressed pale, scale-like hairs; cuneus usually reddish-brown; membrane and veins uniformly dusky translucent; legs pale to dark reddish-brown, front and middle tibiae paler; ventrals dark brown to black; genital segment strongly shining, beset with prominent hairs. Antennæ pale to dark reddish-brown, joint 1 one-fourth longer than width of vertex; 2 three and two-third times the length of 1; 3 subfusiform, slightly more

than one-half as long as 2, 4 three-fourths as long as 3. Front of head coarsely alutaceous. Pronotum alutaceous, sides feebly sinuate. Scutellum finely transversely rugose. Length, 4.5 mm.

Kosciusko Co., Ind., July 12 (*W. S. B.*). Galesburg, Ill., June 26 (*Ill. Nat. Hist. Surv. Coll.*). Ranges from New York west to Minnesota and Illinois, and south to Georgia. Occurs from June to August, mainly on trunks and limbs of hickory.

GROUP II.—CERATOCAPSUS.

KEY TO EASTERN SPECIES OF GROUP II, CERATOCAPSUS.

- a. Third antennal longer than width of vertex plus the dorsal width of an eye.
 - b. Third antennal shorter than width of head across eyes; brownish-yellow, thickly pubescent, cuneus in part reddish. 884. *PUMILUS*.
 - bb. Length of third antennal subequal to or greater than width of head.
 - c. Smaller, length less than 4 mm.; upper surface with long conspicuous hairs; female ovate, brachypterous.
 - d. General color dark reddish-brown; antennæ of female longer than body; cuneus brown. 885. *SETOSUS*.
 - dd. General color pale brownish-yellow; antennæ of female shorter than body; cuneus of male reddish. 886. *PUNCTULATUS*.
 - cc. Larger, 4.5 mm.; cuneus red, corium yellowish-brown. 887. *DRAKEI*.
 - aa. Third antennal not longer than width of vertex plus dorsal width of an eye.
 - e. Width of vertex of male less than dorsal width of an eye; female with hind femora reddish on apical half; cuneus red.
 - f. Corium yellowish-brown, translucent; under surface brownish-black; fourth antennal four-fifths the length of third. 888. *FUSCINUS*.
 - ff. Corium reddish- to fuscous-brown, not translucent; under surface in great part or wholly red; fourth antennal one-half the length of third. 889. *RUFISTIGMUS*.
 - ee. Width of vertex of male greater than dorsal width of an eye; femora of female greenish or yellowish, not reddish on apical half.
 - g. Upper surface densely clothed with suberect, bristle-like pubescence; apical half of membrane scarcely darker than basal half. 890. *DIGITULUS*.
 - gg. Upper surface more sparsely clothed with semi-erect pubescence; apical half of membrane fuscous. 891. *INCISUS*.
- 884 (1139). *CERATOCAPSUS PUMILUS* (Uhler), 1887b, 69.

Oblong-oval. Head, pronotum and scutellum more or less fuscous-brown thickly clothed with appressed yellowish scale-like hairs and suberect yellowish ones; head often tinged with reddish; elytra in great part brownish-yellow, embolium and outer third of cuneus yellowish-translucent, inner half of cuneus reddish or fuscous; membrane pale dusky-

translucent, the margins and base adjoining cuneus paler; legs yellow, hind femora often reddish-brown; under surface pale to dark brown, shining; pleura fuscous-brown. Antennæ stout, half the length of body; joints 1—3 yellowish, 1 three-fourths as long as width of vertex; 2 thickly pubescent, more than three times the length of 1; 3 and 4 as thick as apex of 2, 3 one-half the length of 2; 4 and apex of 3 fuscous-brown, 4 one-half as long as 3. Beak reaching apex of middle coxæ. Pronotum and elytra distinctly, finely, sparsely punctate. Length, 3.8—4.2 mm.

Starke, Marion and Posey counties, Ind., July 17—Sept. 6; beaten from ash and wild grape (*W. S. B.*). Staten Island, N. Y., and Jamesburg, N. J., July (*Davis*). Recorded from Sanford and Crescent City, Fla. Ranges from Ontario and New England west to North Dakota and Colorado, and southwest to Florida and Texas, but some of the records doubtless belong to other species. Uhler says that in Maryland it occurs abundantly in June and July on *Crataegus*; also on willows as late as the middle of October.

885 (1140). *CERATOCAPSUS SETOSUS* Reuter, 1909, 70.

Male—Elongate-oval. Dark chestnut-brown, thinly clothed with very fine pubescence and with a few scattered suberect yellowish hairs; head, basal portion of hind margin of pronotum, commissure and embolium usually paler; membrane uniform dusky translucent; legs greenish-yellow; under surface fuscous-brown, the genital region paler. Beak reaching first ventral. Antennæ slender, three-fourths the length of body; joints 1 and 2 yellow, 2 as long as head and pronotum united; 3 and 4 fuscous, 3 two-fifths the length of 2; 4 one-half the length of 3. Pronotum finely transversely rugose, finely, unevenly but distinctly punctate, sides straight, basal angle obtuse. Elytra entire, finely, closely and rather deeply punctate. Length, 3.5—3.8 mm. *Female*—Ovate, gradually widened from head backward. Elytra reaching apex of abdomen, their tips separately rounded; clavus scarcely distinct from corium; cuneus absent, membrane very short. Antennæ longer than body. Length, 2.5 mm.

Marion and Knox counties, Ind., June 3—Oct. 30; swept from herbage along the alluvial banks of streams. Dunedin and Sanford, Fla., Nov. 26—April 4. Ranges from New Jersey west to Indiana and southwest to Florida. Recorded also from California. The only previous Florida station records are Lake Worth and Atlantic Beach.

886 (1135). *CERATOCAPSUS PUNCTULATUS* (Reuter), 1876, 82.

Male—Elongate, slender, sides subparallel. Pale brownish-yellow, sparsely clothed with long, inclined yellowish hairs; cuneus in great part reddish; membrane pale translucent, iridescent, apical half darker; legs

and antennæ pale yellow. Elytra surpassing abdomen, finely and sparsely punctate. *Female*—Oblong-oval, widest behind the middle. Color and pubescence as in male, front of head, scutellum, apical half of corium and ventrals usually tinged with fuscous. Pronotum trapezoidal, but slightly wider at base than long at middle, disk finely sparsely punctate; calli large, prominent, well separated. Elytra reaching sixth dorsal, finely and thickly punctate, tips subtruncate, cuneus poorly differentiated, membrane scarcely evident. Antennæ in both sexes with joints 1 and 2 pale yellow, 1 three-fourths as long as width of vertex, 2 three and one-half times the length of 1; 3 and 4 dusky yellow, 3 two-fifths the length of 2, 4 one-half as long as 3. Length, 2—3 mm.

Hillsboro Canal and Dunedin, Fla., Dec. 19—March 24. Beaten from foliage of wax-myrtle and taken from beneath boards. A neotropical species, described from Texas. Known from the West Indies and not before recorded from Florida.

887 (—). *CERATOCAPSUS DRAKEI* Knight, 1923, 533.

Elongate, sides subparallel. Head reddish, vertex darker; pronotum brown, calli piceous; scutellum dark brown, both it and elytra sparsely clothed with erect yellowish hairs, intermixed with short appressed silvery ones; clavus and corium yellowish-brown, translucent; membrane and veins pale, apical half darker; legs yellowish-brown; ventrals brownish-black. Joints 1 and 2 of antennæ dull yellow, apex of 2 darker; 1 one-half longer than width of vertex; 2 three and one-half times the length of 1; 3 and 4 fuscous, 3 three-fifths as long as 2, 4 nearly three-fifths the length of 3. Beak reaching between hind coxæ. Length, 4.5 mm.

Recorded from New York and Alberta.

888 (—). *CERATOCAPSUS FUSCINUS* Knight, 1923, 531.

Oblong-oval. Head dull yellow; pronotum brownish-black, basal fourth of disk yellowish, male, yellowish with only calli dark, female; scutellum brownish-yellow, darker at base, both it and elytra clothed with prominent suberect yellowish hairs, intermixed with shorter, appressed scale-like pubescence; apical half of corium of male often heavily tinged with fuscous; cuneus reddish; membrane pale hyaline, the middle of apical half sometimes darker; legs and ventrals dull yellow, apical half of hind femora reddish. Joints 1 and 2 of antennæ yellow; 1 with a red spot on inner side at base, as long as width of vertex; 2 nearly four times as long as 1; 3 yellowish at base, darker apically, one-half the length of 2; 4 fuscous-brown, as thick as and one-fifth shorter than 3. Beak reaching between middle coxæ. Length, 3.6—3.8 mm.

Marion Co., Ind., July 10 (*W. S. B.*). Batavia, N. Y., Aug. 10; Ramsey Co., Minn., July 11 (*Minn. Univ. Coll.*). Ranges from New York west to Minnesota and south to Maryland. Occurs on the black willow, *Salix nigra* Marsh.

889 (—). *CERATOCAPSUS RUFISTIGMUS* Knight Ms.

Oblong-oval. Head yellow, often tinged with red; pronotum brownish-black, the basal fourth paler; scutellum brownish-yellow, paler toward apex; clavus and corium pale to dark brown, embolium yellow-translucent, cuneus red; membrane a uniform dusky translucent; legs greenish-yellow, the tibiæ and basal halves of all the femora more or less tinged with red; under surface greenish-yellow, heavily tinged with red, the pro- and meso-pleura sometimes fuscous-brown. Antennæ stout, half the length of body, of nearly equal thickness throughout; joint 1 yellow with a small red spot near base, longer than width of vertex, male, three-fourths as long, female; 2 yellow, gradually feebly thickened from the base, nearly four times the length of 1; 3 and 4 reddish-yellow, more or less tinged with red, united shorter than 2, 4 one-half the length of 3. Eyes of male very large, their dorsal width greater than that of vertex, coarsely granulated; of female smaller, more narrow than vertex, more finely granulated. Beak reaching between hind coxæ. Entire upper surface, including cuneus, but excepting head and membrane, coarsely, evenly and deeply punctate, each puncture bearing a long conspicuous yellowish inclined hair. Length, 3.2—3.7 mm.

Dunedin, Fla., Nov. 21—April 20. Frequent in fall and spring on ferns and other low herbage in and about the margins of dense hammocks and in low moist grounds; hibernates beneath boards and other cover. The eyes of male are much larger and consequently the width of vertex narrower than in females.

890 (—). *CERATOCAPSUS DIGITULUS* Knight, 1923, 533.

Oblong-oval. Dark brown to piceous with pubescence as in key, on elytra intermixed with appressed silvery scale-like hairs; embolium yellowish-translucent, cuneus reddish or reddish-brown; membrane pale fuscous-brown; legs uniformly greenish-yellow; ventrals dark brown, shining. Antennæ with joints 1, 2 and basal half of 3 yellowish, remainder brownish; joint 1 slightly shorter than width of vertex, male, one-fifth shorter, female; 2 nearly four times the length of 1; 3 one-half as long as 2, 4 three-fourths the length of 3. Beak reaching between hind coxæ. Pronotum and elytra rather coarsely rugosely punctate. Length, 3.4—3.6 mm.

Dubois, Ill., July 2 (*Ill. Nat. Hist. Surv. Coll.*). Recorded only from New York.

891 (—). *CERATOCAPSUS INCISUS* Knight, 1923, 532.

Oblong-oval. Head blackish, reddish beneath; pronotum and scutellum black or brownish-black, the basal half of former often in part paler; elytra brownish-yellow, cuneus reddish or reddish-brown; basal half of membrane and veins dusky, apical half fuscous; legs greenish-yellow; ventrals dark reddish-brown to piceous. Joints 1 and 2 of antennæ dull yellow; 1 tinged with reddish, slightly shorter than width of vertex, male,

subequal thereto, female; 2 slender at base, feebly thickened and dusky apically, nearly four times longer than 1; 3 and 4 brownish, 3 slightly less than half the length of 2, 4 one-fifth shorter than 3. Beak reaching hind margins of middle coxæ. Length, 3.7—4 mm.

Ithaca, N. Y., July 26 (*Minn. Univ. Coll.*). Known only from New York, where it occurs on willow.

Tribe VI. SYSTELLONOTINI Knight, 1923, 497.

This tribe, as characterized in the key, p. 796, is represented in the eastern states by a single genus.

I. SERICOPHANES Reuter, 1876, 79.

Small, elongate, slender, subglabrous species having the head large, its width across the eyes but slightly narrower than base of pronotum, front subvertical, vertex margined behind, merged with the tylus in front; beak reaching hind coxæ; antennæ slender, nearly as long as body, all the joints subequal in thickness; pronotum (macropterous form) campanulate, as wide at base as long, the base nearly twice as wide as apex, disk with sides feebly sinuate, basal portion convex, declivent forward, hind margin truncate, basal angles prominent; elytra

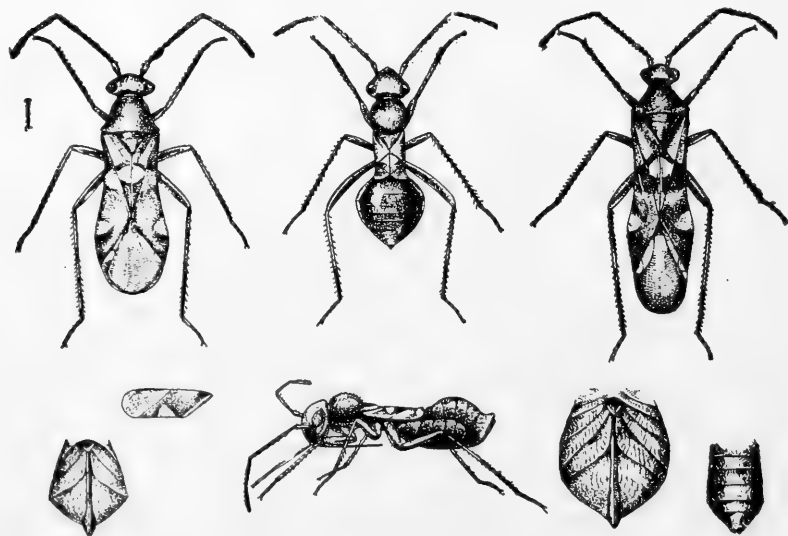


Fig. 180. Above, macropterous female at left, brachypterous female at middle, male at right. Below, abdomen of macropterous female at left; side view of brachypterous female at middle; male abdomen at extreme right. (After Osborn).

dimorphic, in males usually surpassing abdomen, cuneus declivent but fracture weak; legs long, tibiæ finely spinulose, first joint of hind tarsi longer than second. One species occurs in the eastern states.

892 (1097½). SERICOPHANES HEIDEMANNI Poppius, 1914a, 260.

Male—Elongate, slender, narrowed at middle. Head, pronotum, scutellum and under surface dark chestnut-brown to blackish; elytra paler brown, with a large rounded pale spot on middle of commissure and two vague oblique silvery-gray blotches on corium, the basal one reaching onto clavus; membrane dusky pubescent, whitish at base; legs reddish-brown, hind coxæ paler. Antennæ with joints 1 and 2 pale brownish-yellow, finely pilose, 1 slightly stouter than the others, a little shorter than width of vertex; 2 cylindrical, nearly five times as long as 1; 3 and 4 fuscous-brown, 3 two-thirds the length of 2, 4 subfusiform, two-thirds as long as 3. Pronotum minutely alutaceous; humeral angles broadly rounded into basal margin. Elytra with costal margins broadly concave, ciliate with minute yellow bristles; disk of corium smooth, beset with a few erect yellowish hairs; membrane surpassing abdomen by more than half its length. *Brachypterous Female*—Ant-like in form. Yellowish brown. Pronotum and abdomen subglobose. Elytra reaching only to base of third dorsal. Length, 3.1—3.5 mm. (Fig. 180).

Marion Co., Ind., Aug. 1; at desk light (*W. S. B.*). Palos Park and Willow Springs, Ill., May 31—June 4 (*Gerhard*). Recorded only from New England, New York and Minnesota, but probably to be found in intervening states north of latitude 40°. Occurs on upland grassy ridges, the males also often at light. Recorded mostly heretofore as *S. ocellatus* Reut., a smaller and much paler Texan species. The *S. noctuans* Knight (1917b, 4) is a synonym of *heidemanni*.

Tribe VII. LOPIDINI Van Duzee, 1916a, 212 (*Lopidearia*).

To this tribe, as characterized in the key, p. 797, belong three of our eastern genera of Orthotylinæ.

KEY TO EASTERN GENERA OF LOPIDINI.

- a. Base of vertex without a bristle-bearing ridge across its full width; upper surface not beset with numerous erect black bristles.
- b. Base of tylus below a line drawn through the lower margin of eyes; cheeks not divided by an oblique suture beneath the eyes; elytra in great part green or greenish-yellow.
 - I. ILNACORA, p. 832.
- bb. Base of tylus above a line drawn through the lower margin of the eyes; cheeks divided by an oblique suture leading from base of antennæ to beneath eyes; elytra usually red and black, never green.
 - II. LOPIDEA, p. 834.

- aa.* Base of vertex with a high carina or ridge extending from eye to eye, this beset with bristles; pronotum and elytra with numerous erect black bristle-like hairs; color fuscous-brown.

III. HADRONEMA, p. 843.

I. ILNACORA Reuter, 1876, 85.

Elongate, slender, subparallel species having the head wider across eyes than apex of pronotum, its front nearly vertical; vertex flattened, its base carinate at middle; cheeks strongly convex; antennæ about two-thirds the length of body, joints 1 and 2 of nearly equal thickness, 3 and 4 much more slender; pronotum trapezoidal, without subapical stricture, but with a transverse ridge before the calli; scutellum flat, triangular, equilateral; mesoscutum concealed; elytra entire, surpassing abdomen. Three species have been recorded from the eastern states.

KEY TO EASTERN SPECIES OF ILNACORA.

- a.* Under surface green or greenish-yellow; head wholly dull yellow. 893. STALII.
- aa.* Under surface in great part or wholly black; head black, or yellow with black lines or stripes.
 - b.* Pronotum with a conspicuous round black spot behind each callus; eyes distant from front of pronotum; membrane dark brown. 894. MALINA.
 - bb.* Pronotum with at most a small spot of black pubescence behind each callus; eyes almost contiguous with front of pronotum; membrane dusky hyaline, the veins yellow. 895. DIVISA.

893 (1184). ILNACORA STALII Reuter, 1876, 86.

Color a nearly uniform pale green, fading to greenish-yellow, sparsely pubescent with inclined whitish hairs and usually with a small spot composed of black scale-like hairs behind each callus, another on base of scutellum and one at inner basal angle of cuneus, these easily abraded and often wanting; membrane pale hyaline with a vague transverse fuscous bar behind the cells; legs and under surface greenish-yellow, the tips of beak and tibiæ and joint 3 of tarsi fuscous. Joint 1 of antennæ slightly longer than width of vertex, pale yellowish with a ring near base and a broader one behind apex, blackish; 2 reddish-brown, usually fuscous at base and toward apex, three and a half times longer than 1; 3 and 4 fuscous, united subequal in length to 2, 4 one-half as long as 3. Length, 5.3—5.7 mm.

Marion, Putnam and Crawford counties, Ind., June 19—Sept. 5; probably occurs throughout the State. Swept from cocklebur, ragweed and other herbage, mainly in low, moist places, though sometimes on high wooded ridges. Ranges from New

York west to the Dakotas, Colorado and Texas. Not recorded in the east south of New Jersey. The pubescence of upper surface is easily abraded and older examples are almost wholly glabrous. In those just emerged the black scale-like hairs form spots as mentioned in the description; often, also, numerous smaller spots on the elytra.

894 (1185). *ILNACORA MALINA* (Uhler), 1877, 419.

Head black, shining, the vertex in part dull yellow; elytra and basal half of pronotum bright green; front half of pronotum a broad stripe each side of scutellum and legs greenish-yellow; a large round spot behind each callus, middle of scutellum and under surface in great part blackish; membrane dark brown, veins in part paler. Joint 1 of antennæ stoutest, slightly longer than width of vertex, fuscous-brown, pale at base; 2 fuscous, three times as long as 1; 3 and 4 dusky, subequal in length, united slightly longer than 2. Calli more prominent with impression between them deeper than in *stalii*. Elytra smooth, when fresh sparsely pubescent with very fine prostrate hairs; middle of corium often with an elongate patch of black deciduous scale-like hairs and sometimes with a vague fuscous stripe along its apical half. Length, 5.5—6 mm. (Fig. 181).

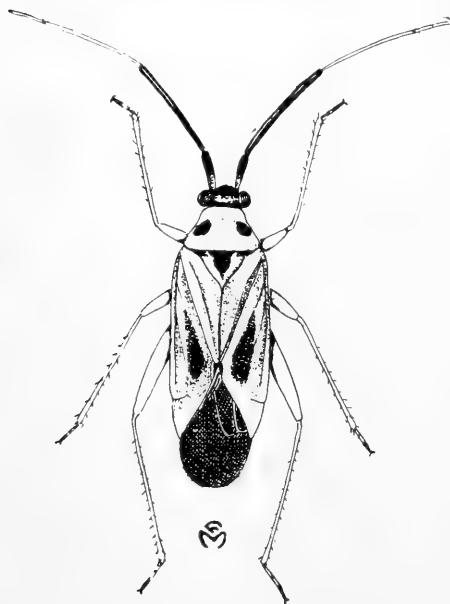


Fig. 181, X 7. (Original).

Common throughout Indiana, May 19—Aug. 20. Swept from foliage of Virginia creeper and poison ivy growing in low alluvial soil; also from herbage in dense woodland. Henderson, Ky., June 15 (*Marshall*). Ranges from New England west to South Dakota and Kansas and south to Maryland. Recorded also from Texas and Mexico. The food plant, according to Knight, is the rough-leaved goldenrod, *Solidago rugosa* Mill., growing in shaded damp places.

895 (1181). *ILNACORA DIVISA* Reuter, 1876, 86.

Pale greenish-yellow, vertex and front of pronotum often paler; head with tylus, a median stripe on vertex and three lines or narrow stripes on front, blackish; disk of pronotum with two small transverse spots of

dense black pubescence; base of scutellum often with a triangular median spot of similar pubescence; antennæ yellowish, joint 1 with a basal and apical black ring, 2 black at base, its apical portion and all of 3 and 4 fuscous-brown; legs yellow, apex of tibiæ and tarsi black; joints 1 and 2 of beak yellow, 3 and 4 piceous; under surface black, opaque, clothed with pale pubescence. Vertex distinctly wider and more flattened than in our other species. Pronotum shorter with sides less convergent from the base. Length, 5 mm.

Marshall and Ft. Snelling, Minn., June 19—July 12 (*Minn. Univ. Coll.*). Described from Texas. Recorded from New Jersey and Colorado.

II. LOPIDEA Uhler, 1872, 411.

Elongate, subparallel, impunctate, almost glabrous species having the head broader across eyes than apex of pronotum, twice as long as broad, its front vertical, vertex subdepressed and with an indistinct median basal carina; tylus prominent, curved; eyes rather small, rounded, slightly protuberant, contiguous to pronotum, finely faceted; antennæ about two-thirds as long as body, variable in length as to species, joint 1 usually the stoutest, 3 and 4 much more slender than either 1 or 2; beak reaching or surpassing middle coxæ; pronotum subtrapezoidal, about one-half wider at base than long, sides sinuate, disk with a vague but evident constriction in front of middle and a transverse ridge in front of calli, basal portion convex, humeral angles rounded, basal margin subtruncate; scutellum triangular, equilateral; elytra entire, cuneus moderately deflexed. Males with left clasper broad, more or less flattened, tip bifurcate.

The genus is closely allied to *Ilucora*, but the species are stouter of body with color never green as there. The genus *Lomatopleura* Reut. has been united with *Lopidea* by Knight (1917c, 455) as he found the antennal characters upon which it was chiefly based would not hold good in some of the western forms. He has described 30 or more new species of *Lopidea* since the Van Duzee Catalogue was issued, basing them mainly upon the differences in the genital claspers of the males. The student who wishes to identify them along this line is referred to his papers on the genus as cited in the bibliography. Of the 50 species described from North America up to the present writing, 18 are either recorded or known from the eastern states. The original descriptions of these are widely scattered

and a key leading up to their names very difficult to form. Knight did not attempt one even for the 12 species he included in the Hemiptera of Connecticut. The following will perhaps enable the student to correctly identify the majority of our eastern species:⁸⁶

KEY TO EASTERN SPECIES OF LOPIDEA.

- a. Joints 1 and 2 of antennæ very stout, joint 1 subelavate, 2 distinctly thicker just behind middle than at apex. (Subgenus *Lomatopleura*).
 - b. Femora black or brown; head in part black; length, 7 or more mm.
 - c. Calli red; scutellum not or but slightly tinged with fuscous.
 - 896. CÆSAR.
 - cc. Calli fuscous; scutellum strongly tinged with fuscous; host plant witch-hazel, *Hamamelis virginiana* L.
 - 898. REUTERI.
 - bb. Femora red; head mostly pale, sometimes tinged with fuscous, the base and rarely the front of vertex black or fuscous; length not more than 6.5 mm.
 - d. Embolium and pronotum wholly red; head wholly pale; calli red.
 - 899. INSTABILE.
 - dd. Embolium and usually the basal angles of pronotum straw-yellow; front of head usually blackish; calli fuscous.
 - 900. MARGINALIS.
- aa. Joints 1 and 2 of antennæ slender, joint 1 cylindrical, 2 not distinctly thicker just behind middle than at apex. (Subgenus *Lopidea*).
 - e. Larger, length 6 or more mm.
 - f. Pronotum without a distinct blackish cross-bar on apical half; coxæ and trochanters in great part or wholly pale; head usually with two fuscous stripes which are more or less confluent behind.
 - g. Joint 1 of antennæ shorter than width of vertex; color orange- or brick-red; scutellum and inner apical halves of clavus and corium at most but slightly tinged with fuscous; host plant, leaf-cup, *Polymnia uvedalia* L.
 - 901. CONFLUENS.
 - gg. Joint 1 of antennæ as long as or slightly longer than width of vertex.
 - h. Scutellum, clavus and corium heavily tinged with black or fuscous.
 - i. General color deep red; middle of basal half of pronotum heavily tinged with fuscous; length, 6—6.2 mm.; host plant, the veiny pea or vetchling, *Lathyrus venosus* Muhl.
 - 902. LATHYRÆ.
 - ii. General color orange- or dull clay-yellow; basal half of pronotum not or lightly tinged with fuscous; length, 6.5—6.8 mm.; host plant, black locust, *Robinia pseudacacia* L.
 - 903. ROBINIÆ.
 - hh. Scutellum, clavus and corium not at all or but lightly tinged with fuscous; length, 6.5—7 mm.; host plant, American bladdernut, *Staphylea trifolia* L.

⁸⁶Three species, *L. hesperia* (Kirk.), *sayi* Knight and *floridana* (Walker) are not included in the key, as no examples of them have been seen, and the original descriptions, copied farther on in the text, contain no definite characters of sufficient importance to readily separate them from their allies.

- j. General color dull clay-yellow. 905. STAPHYLEÆ.
 jj. General color bright red. 905a. var. SANGUINEA.
 ff. Pronotum with a more or less distinct blackish cross-bar on or just behind the calli, sometimes almost wholly blackish; middle and hind coxæ and trochanters in great part or wholly black, front ones sometimes pale; head with front in great part black, rarely with two distinct black stripes.
 k. Basal half of pronotum pale or but feebly tinged with fuscous.
 l. General color dark red; elytra rarely tinged with fuscous; female with embolium usually pale yellow; host plants, elm, yarrow and probably goldenrod. 906. HEIDEMANNI.
 ll. General color orange-yellow; apical halves of clavus and elytra always heavily tinged with fuscous; host plant, false indigo, *Amorpha fruticosa* L. 907. AMORPHÆ.
 kk. Pronotum, except narrow front and side margins, heavily tinged with fuscous; general color fuscous-brown, the narrow costal margin and inner half of cuneus usually orange-red; host plants the balsam poplar, *Populus balsamifera* L., and cottonwood, *P. deltoides* Marsh. 908. CUNEATA.
 ee. Smaller, length less than 5.8 mm.
 m. General color red or orange-yellow.
 n. Pronotum wholly red; coxæ pale yellow; embolium of female pale translucent yellow; host plant, rough-leaved goldenrod, *Solidago rugosa* Mill. 909. MEDIA.
 nn. Pronotum with calli and base fuscous; coxæ fuscous; embolium of female concolorous with corium; host plant, wild and cultivated phlox. 910. DAVISI.
 mm. General color black or fuscous-brown.
 o. Smaller, length, 4.8—5 mm.; legs pale fuscous, basal half of femora and coxæ straw-yellow with a pinkish tinge; host plant, honey locust, *Gleditsia triacanthos* L. 911. INCURVA.
 oo. Larger, length, 5.7 mm.; legs black, trochanters and coxæ paler; host plant, black willow, *Salix nigra* Marsh. 912. SALICIS.

896 (1143). LOPIDEA CÆSAR (Reuter), 1876, 67.

Deep carmine-red; tylus, joints 1 and 2 of antennæ, tibiæ and genital region black; two vague stripes on front of head, base of vertex, membrane and femora fuscous-brown; scutellum and inner apical half of clavus often slightly tinged with fuscous. Joint 1 of antennæ stout, narrowed at base, about as long as width of head; 2 densely clothed with short stiff inclined black hairs, three and a half times as long as 1, the apical half tapering from the middle toward apex; 3 and 4 finely pubescent with grayish hairs, 3 three-fifths as long as 2, 4 more slender than and two-fifths the length of 3. Pronotum and scutellum smooth, glabrous; clavus and corium very finely and sparsely pubescent, finely rugose. Length, 7—8 mm.

Ft. Montgomery, N. Y., July 26 (*Davis*). The recorded range extends from New England west to Michigan and Colorado and southwest to North Carolina. The only mention of its habits is

that of Hussey who says it is "One of the characteristic Hemiptera of the black oak association on the dunes of southeastern Michigan. Nymphs were numerous early in July and the first adults were taken July 20."

897 (1144). *LOPIDEA HESPERIA* (Kirkaldy), 1902b, 252.

"*Male*—Bright red, fusiform, very finely punctured. Head triangular. Eyes piceous, slightly prominent; rostrum piceous, extending to middle coxæ. Antennæ black, shorter than body; first and second joints slightly dilated; first as long as head; second more than twice the length of first; third a little longer than first; fourth much shorter than third. Prothorax with a callus on each side near fore border. Scutellum, legs, membrane and hind wings black. Legs slender. Length of body, $2\frac{1}{4}$ lines (4.5 mm.). St. John's Bluff, East Florida. Presented by E. Double-day, Esq."

The above is the original description of the *Capsus coccineus* Walker (1873, 93). As the name *coccineus* was preoccupied, it was changed to *hesperia* by Kirkaldy and was placed in the genus *Lomatoplcura* by Distant (1904, 109).

898 (—). *LOPIDEA REUTERI* Knight, 1917c, 459.

Deep carmine red; scutellum and margins of commissure reddish-fuscous; corium and cuneus with fuscous marks more narrow than in *cæsar*, sparsely clothed with blackish pubescence; legs black; sternum, ventrals 4—6 and genital segment blackish. Antennæ as in *a* of key, joint 1 slightly shorter than width of head, 2 three and three-fourths times as long as 1, 3 two-thirds the length of 2, 4 three-fifths as long as 3. Length, 7 mm.

Ramapo, N. Y., and Hollister, Mo., July 22 (*Davis*). The known range extends from Massachusetts and New York, west to Missouri and south to Virginia, but as its food plant, witch hazel, is distributed throughout the entire eastern United States and Canada, the range of the insect will probably be found to be almost coextensive.

899 (1145). *LOPIDEA INSTABILE* (Reuter), 1909, 72.

Elongate, suboval. Bright carmine-red; scutellum in part, clavus except the basal fourth, membrane and inner half of corium blackish-fuscous; tibiæ and tarsi black. Antennæ black, joints 1 and 2 thickly clothed with stiff inclined bristle-like hairs; 1 as long as width of vertex, strongly narrowed at base; 2 gradually thickened from base to middle, thence narrowed to apex, three times longer than 1; 3 and 4 thickly clothed with very fine grayish hairs, 3 two-thirds the length of 2, 4 more slender, two-fifths as long as 3. Costal margin very broadly but visibly curved. Length, 5.5—6 mm.

Dunedin, Fla., April 8—20 (*W. S. B.*). Tarboro and Laurel Hill, N. Car., June—July (*Brimley*). Ramsey, N. J., July

(Davis). About Dunedin it occurs in some numbers on the foliage of the scurfy ericad, *Nolisma fruticosa* Michx., and other shrubs in pine woods. Recorded from Crescent City and Sanford, Fla. Ranges from New York west to North Dakota and southwest to Florida.

900 (1145a). *LOPIDEA MARGINALIS* (Reuter), 1909, 72.

Closely allied to *instabilis*. Front of head with a black spot, sometimes in great part fuscous; elytra widely and obscurely fuscous; scutellum and calli heavily tinged with fuscous; embolium pale yellow, rarely bright red. Length, 6—6.5 mm.

Willow River, Minn., Aug. 7 (*Minn. Univ. Coll.*). Originally described from Maryland as a variety of *instabilis*. Raised to specific rank by Knight on account of distinctions in the male claspers. Recorded by him from Connecticut. Readily known from other species of the subgenus by the pale embolium.

901 (1147). *LOPIDEA CONFLUENS* (Say), 1832, 23; I, 343.

Orange-red to dull orange-yellow; head with antennæ, tylus, beak, base of vertex and two stripes on front, fuscous-black; pronotum vaguely, scutellum, apical two-thirds of clavus and inner third of corium more or less tinged with fuscous; narrow edge of embolium often yellowish translucent; membrane blackish-fuscous; legs fuscous-brown to blackish, the coxæ pale; under surface orange-red, mesosternum and genital region usually darker. Joint 1 of antennæ cylindrical, about one-fifth shorter than width of vertex; 2 linear, of nearly equal thickness throughout, about three times the length of 1; 3 three-fifths the length of 2, nearly twice as long as 4. Form longer, with sides more parallel than in our other species except *staphylæ* and *robinæ*. Length, 6.3—6.5 mm.

Frequent throughout Indiana, June—August. Palos Park, Ill., July 16 (*Gerhard*). Blowing Rock, N. Car., September (*Brimley*). In Indiana it has been taken from the foliage of *Crataegus*; horse gentian, *Triosteum perfoliatum* L.; and other plants along the margins of woods. The recorded range extends from Quebec and New England west to Montana, Colorado and Kansas, and southwest to Texas, but many of the older records doubtless refer to species lately described by Knight.

902 (—). *LOPIDEA LATHYRÆ* Knight, 1923b, 66.

Head, except cheeks, loræ and a vague spot on each side of vertex, black; disk of pronotum fuscous-brown, the narrow front edge and side margins red; scutellum, clavus, membrane and inner half of apical two-thirds of corium dark fuscous-brown; legs fuscous-brown, the tibiæ black, coxæ and trochanters in great part dull yellow; under surface red, the mesosternum and genital region fuscous. Joints 1 and 2 of antennæ black, 1 as long as width of vertex; 2 cylindrical, three times as long as

1; 3 and 4 clothed with a very short pale pubescence, 3 three-fourths the length of 2, 4 two-fifths as long as 3. Length, 6—6.5 mm.

Palos Park, Ill., July 2; Anoka Co., Minn., July 6 (*Gerhard*). Recorded by Knight from Minnesota, North Dakota, Manitoba and Saskatchewan. In Anoka County, Minn., he found it so numerous in July in spots that the host plant, *Lathyrus venosus* Muhl., was largely killed. As this plant occurs in the northern third of Indiana the bug will probably be found in that region. In the Illinois specimens at hand both sexes have the embolium and outer third of cuneus pale translucent yellow, not the females alone, as stated by Knight.

903 (1149). *LOPIDEA ROBINIÆ* (Uhler), 1861, 24.

Dull orange- or clay-yellow; tylus, usually two stripes on vertex, scutellum, clavus, inner apical half of corium and entire membrane fuscous; legs fuscous, the coxæ and basal halves of femora dull yellow; under surface orange- to clay-yellow, the middle of ventrals usually darker; antennæ and beak dark fuscous-brown to black, the segments of the former of the same relative length as in *confluens*. Length, 6.5—6.8 mm.

Vermilion, Marion, Putnam and Knox counties, Ind., July 17—Aug. 15; probably occurs on the black locust wherever that tree is found in the State. Washington, D. C., July (*Gerhard*). Its known or recorded range extends from Ontario and New England west to Indiana and southwest to North Carolina, though the records are few.

904 (—). *LOPIDEA SAYI* Knight, 1918, 212.

"*Male*—Slightly smaller than *staphyleæ*, but very similar in coloration, the antennæ being more nearly linear; bright yellow to light orange, the scutellum and more or less on each side of commissure, fuscous; base of head and each side of median line of front, tylus, rostrum, antennæ, membrane, femora and tibiæ, black. Sternum and sometimes part of the venter, fuscous; genital claspers distinctive of the species. *Female*—Very similar to the male but with more fuscous and less orange in the yellow. Length, 6.1 mm.; width, 2.1 mm." (*Knight*).

The above is the original description. Described from Brown's Ferry on Savannah River, S. Car., and Plummer's Island, Md.

905 (—). *LOPIDEA STAPHYLEÆ* Knight, 1917c, 460.

Dull clay-yellow; calli, narrow base of pronotum, scutellum, apical two-thirds of clavus, membrane and inner half of corium more or less tinged with fuscous; antennæ, tylus and two stripes on vertex, dark brown to blackish; legs and beak in great part blackish-fuscous, coxæ, trochanters and basal joint of beak yellowish; under surface dull orange-yellow, the mesosternum and genital region often darker. Joint 1 of

antennæ equal to width of vertex, male, slightly longer, female; 2 three and a half times the length of 1, its apical third very slightly tapering; 3 linear throughout, three-fourths the length of 2; 4 one-fourth as long as 3. Length, 6.5—6.8 mm.

Marion and Floyd counties, Ind., May 31—June 23; swept from its host plant, the bladder-nut. Recorded from New York, Maryland, Virginia and Michigan. Knight found it common near Batavia, N. Y., the adults maturing July 18. Many of them soon afterward left the host plant, congregating and mating on nearby hickory trees. Hussey records it as very common in late June on *Staphylea* in southwestern Michigan.

905a (—). *LOPIDEA STAPHYLEÆ SANGUINEA* Knight, 1917c, 461.

"Size, structure of antennæ and male genital claspers not differing appreciably from typical *staphyleæ* but the yellow coloration replaced by bright red. Females much resembling those of *reuteri* and *cæsar*, but distinguished from them by the slender form of antennæ." (*Knight*).

Willow Springs, Ill., Aug. 2 (*Gerhard*). Recorded from Massachusetts, Connecticut and Minnesota.

906 (—). *LOPIDEA HEIDEMANNI* Knight, 1917c, 456.

Male—Dark red, antennæ, tylus, front of head or two stripes thereon and bar across calli, black or blackish-brown; scutellum, membrane, legs, metasternum and genital region fuscous-brown; remainder of under surface red. Joint 1 of antennæ feebly curved, one-half longer than width of vertex; 2 three and one-half times the length of 1; 3 two-thirds as long as 2, 4 one-fourth the length of 3. Elytra often slightly but visibly tapering from base to apex, the clavus and corium usually with numerous vague oblique rugæ, very sparsely clothed with short fine yellowish-hairs; costal margin with longer suberect blackish ones. Length, 6.7—7 mm. *Female*—Slightly more robust than male, the elytra feebly broadly curved from base to apex. Color somewhat paler, sometimes dull orange-red, the dark cross-bar of pronotum rarely wanting; inner apical halves of clavus and corium often lightly tinged with fuscous; embolium usually wholly pale yellowish. Length, 6.2—6.5 mm.

Marion and Putnam counties, Ind., June 1—July 5; beaten from elm (*H. S. B.*). Columbus, Ohio, July 12; Palos Park, Ill., June 7 (*Gerhard*). Swannanoa, N. Car., June 22 (*Brimley*). The known range extends from New England west to Illinois and southwest to North Carolina. Near Batavia, N. Y., Knight found it breeding on elm, the nymphs feeding and maturing on the tender terminal growth, usually of young trees. Other nymphs were taken from yarrow, *Achillea millefolium* L., and reared to maturity. The vertex of male is more concave, with eyes more prominent and set more obliquely than in the female or in any of our other species.

907 (—). *LOPIDEA AMORPHÆ* Knight, 1923b, 65.

Elongate, subparallel, feebly tapering behind, male; slightly sub-oval, female. Dull orange-yellow with dark markings of head, pronotum, legs and under surface as in *heidemanni*; elytra clothed with fine yellowish pubescence, the inner apical halves of clavus and corium strongly tinged with fuscous; front coxæ dull yellow. Joint 1 of antennæ nearly twice as long as width of vertex, 2 three and one-half times the length of 1; 3 and 4 densely clothed with very fine grayish pubescence, 3 one-half the length of 2, 4 one-third as long as 3. Length, 6—6.3 mm.

Ramsey Co., Minn., July 8—18 (*Gcrhard*). Recorded as yet only from the type locality, but as the host plant occurs in Indiana and ranges west of Ohio from Manitoba to Florida, the known range of the insect will probably be much extended.

908 (1152). *LOPIDEA CUNEATA* Van Duzee, 1910, 79.

Oblong-ovate. Fuscous-brown; head dull brownish-yellow to fuscous, base of vertex black, front fuscous with a broad pale median stripe; base of radial vein reddish; outer half of cuneus pale, tip black, inner half red; membrane pale fuscous; legs brown, coxæ, trochanters and sometimes the base of femora, pale yellow; ventrals brown, their sides paler, sometimes with reddish spots. Antennæ black, joint 1 as long as width of vertex, 2 as long as head and pronotum united, 3 two-thirds the length of 2, 4 slightly shorter than 1. Beak reaching hind coxæ. Pronotum with sides broadly reflexed, calli strongly elevated, separated by a deep impression; basal half of disk minutely transversely rugose. Length, 6 mm.



Fig. 182, X 7. (After Lugger).

Gray Cloud and Ramsey county, Minn., July 12—20 (*Minn. Univ. Coll.*). Recorded also from Lancaster, N. Y., and Illinois, the host plants as given in key. Some specimens are almost wholly fuscous-black.

909 (1146). *LOPIDEA MEDIA* (Say), 1832, 22; I, 341.

Bright red to orange-red; tylus and two stripes on front of head blackish; scutellum, apical half of clavus and inner apical third of corium more or less tinged with fuscous, the reddish always showing through the infuscation; membrane and femora fuscous-brown; tibiæ black, coxæ pale yellow; under surface red, the mesosternum and genital region blackish.

Joint 1 of antennæ subequal in length to width of vertex, one-third as long as 2; 3 two-thirds the length of 2; 4 one-third as long as 3. Female with the embolium and outer third of cuneus pale translucent yellow. Length, 5.6—5.7 mm. (Fig. 182).

Marion Co., Ind.; June 30 (*H. S. B.*). Swannanoa and Aberdeen, N. Car., June (*Brimley*). Described from Indiana. The recorded range extends from Quebec and New England west to North Dakota, Colorado and Kansas and south to New Jersey; but many of the records are doubtful as to identity. For example, Prof. Uhler once identified for me as *media* what is now recognized as *confluens*, and the name *media* which he made the type of the genus, served for years as a "catch-all" for almost all specimens of *Lopidea* taken from Colorado eastward. In founding the genus (1872, 411) and again (1878, 406) Uhler mentioned his *robinæ*, described in 1861, as a variety of *media*, whereas if it is a variety of anything it is *confluens*. It would not be surprising, therefore, if *confluens* was the species he had in hand and therefore the generic type. However, Say's description will fit any one of several species since described more in detail, and calls for a species "one-fourth of an inch (6.2 mm.) in length to tip of hemelytra," whereas what Knight calls *media* is smaller with length as above given.

910 (—). *LOPIDEA DAVISI* Knight, 1917c, 458.

Elongate-oblong, more robust than *media*. General color reddish-orange; antennæ, tylus, front of head and legs black; calli and base of pronotum, scutellum, clavus, inner half of corium and membrane dark fuscous-brown; under surface with middle fuscous-brown to black, sides pale. Joint 1 of antennæ slightly shorter than width of vertex; 2 three and a fourth times longer than 1, 3 two-thirds the length of 2, 4 two-fifths as long as 3. Female more robust than male, with costal margin of elytra very slightly but visibly curved. Length, 5.5—5.7 mm.

Marion, Knox and Posey counties, Ind., June 19—Sept. 19; swept from *Phlox divaricata* L. growing in dense wooded ravines; also taken from the garden phlox, *P. paniculata* L. The known range extends from New York west to Minnesota and Arkansas and south to Virginia. "A serious pest on cultivated *Phlox* and may very well be called the phlox plant bug" (*Knight*).

911 (—). *LOPIDEA INCURVA* Knight, 1918, 214.

Fuscous-brown, often with a reddish tinge; cheeks, loræ, median stripe on vertex, narrow front and side margins of pronotum, embolium and outer margin of cuneus reddish-yellow; membrane, antennæ, beak and tarsi dark fuscous. Joint 1 of antennæ two-thirds as long as width

of vertex; 2 slightly thickest at middle, tapering toward base and apex, nearly four times as long as 1; 3 linear, two-thirds the length of 2; 4 one-third as long as 3. Length, 4.8—5 mm.

Marion and Vigo counties, Ind., June 22—Aug. 1; common July 5 in all stages on foliage of honey locust. Recorded only from Langdon, Mo., and Galesburg, Ill. It is the smallest of our eastern species.

912 (—). *LOPIDEA SALICIS* Knight, 1917c, 457.

Head, calli, scutellum, cuneus and clavus in great part reddish-fusous; prosternum, propleura and basal angles of pronotum yellowish; remainder of upper surface red. Antennæ dark brown, joint 1 as long as width of head, 2 three times as long as 1, 3 three-fifths the length of 2; 4 one-half as long as 3. Length, 5.7 mm.

Ramsey Co., Minn., June 27 (*Minn. Univ. Coll.*). Known elsewhere only from New York, where it occurred in June on the black willow.

913 (1148). *LOPIDEA FLORIDANA* (Walker), 1873, 97.

"*Female*.:—Red, fusiform, very finely punctured. Head triangular. Eyes piceous, prominent. Rostrum extending to hind coxæ. Antennæ black, slender, as long as body; first joint red, as long as head; second more than twice the length of first; third much shorter than second; fourth less than half the length of third. Prothorax with a callus on each side in front. Legs piceous, slender. Membrane blackish. Hind wings cinereous. Length of body, 2 lines. "St. John's Bluff, East Florida. Presented by E. Doubleday, Esq."

The above is the original description of Walker's *Capsus floridanus* and if it refers to a *Lopidea* may be applied to any one of a half dozen or more known species. Only a study of the type will show its present status.

III. *HADRONEMA* Uhler, 1872, 412.

Elongate, subparallel species having the head wider across eyes than apex of pronotum, its front subvertical; vertex convex without median groove, its base with a prominent, slightly curved carina across its full width; beak reaching middle coxæ; pronotum with a transverse impression behind the calli but without a ridge in front of them as in *Inacora* and *Lopidea*; mesoscutum narrowly exposed; elytra entire, cuneus scarcely distinct from corium; entire upper surface beset with numerous erect black bristle-like hairs. Other characters as in *Lopidea*. One of the five known North American species occurs in our territory.

914 (1153). *HADRONEMA MILITARIS* Uhler, 1872, 471.

Black, opaque, with a leaden tinge; flanks and basal half of pronotum in part reddish-yellow; embolium and outer half of cuneus pale yellow; membrane blackish-fuscous; legs and under surface bluish-black, the ventrals sparsely clothed with rather long appressed yellowish hairs, their lateral edges pale. Antennæ black, half the length of body; joint 1 two-thirds as long as width of vertex; 2 cylindrical, three and one-half times the length of 1; 3 and 4 thinner than 2, subequal in thickness, densely clothed with fine yellowish hairs; 3 three-fifths the length of 2, 4 one-third as long as 3. Hind lobe of pronotum conspicuously transversely rugose, its basal angles broadly rounded. Length, 5—6 mm.

Lake Co., Ind., May 29; swept in some numbers from the white false-indigo, *Baptisia leucantha* Torr. & Gray. Ranges from New York west to the Pacific, feeding on several species of *Baptisia*. Recorded also by Distant from Mexico.

Tribe VIII. ORTHOTYLINI Van Duzee, 1916a, 211 (*Orthotylaria*).

To this tribe, as characterized in the key, p. 797, belong eleven of our eastern genera of the subfamily Orthotylinæ.⁸⁷

KEY TO EASTERN GENERA OF TRIBE ORTHOTYLINI.

- a. Disk of pronotum transversely sulcate behind the calli, the sulcus extending over the sides; calli distinctly arched, separated by a depression.
- b. First antennal not or but slightly longer than width of vertex; female usually suboval, brachypterous, with second antennal distinctly thickened toward apex; color black with pale markings.

I. *GLOBICEPS*, p. 845.

- bb. First antennal nearly as long as width of head across eyes, thicker on basal half and tapering apically; second antennal linear in both sexes; color green or greenish-yellow.

II. *BLEPHARIDOPTERUS*, p. 847.

- aa. Disk of pronotum without a transverse sulcus; calli not so distinctly arched.
- c. Pronotal disk margined at sides; second antennal swollen, fusiform; vertex with a distinct basal margin; upper surface sparsely clothed with whitish scales; general color dull red or black.

III. *HETEROCORDYLUS*, p. 847.

- cc. Pronotal disk without marginal carinæ, the sides sometimes obtusely rounded; second antennal linear, rarely (*Heterotoma*) much thickened and fusiform; basal margin of vertex often feeble or wanting.
- d. Eyes placed near or before the middle of sides of head; elytra in great part translucent hyaline; costal margin of elytra fringed with fine hairs.

⁸⁷The European species, *Cyllocoris histrionicus* (Linn.), Van Duzee number 1158, has no definite station record for this country, and Knight (1922, 281) doubts its occurrence. The genus is therefore not included in the key.

- e.* Form oblong-oval; membrane of nearly the same texture as corium and with only one cell; base of vertex carinate.

IV. HYALOCHLORIA, p. 848.

- ee.* Form elongate, subparallel; membrane differing in texture from corium and with two cells; base of vertex not carinate, male, very obtusely so, female.

V. DIAPHNIDIA, p. 849.

- dd.* Eyes placed near hind margin of head, close to pronotal angles; elytra rarely in great part hyaline.

- f.* First antennal with a black line on each side, these connected beneath near apex; eyes, viewed from above, elongate, their inner margins parallel; color white or greenish, clothed with rather long white pubescence.

VI. REUTERIA, p. 851.

- ff.* First antennal without black lines; eyes not so elongate, their inner margins diverging.

- g.* Joints 1 and 2 of antennæ strongly swollen, 2 fusiform; membrane finely rugose; third and fourth antennals united only half the length of second.

VII. HETEROTOMA, p. 851.

- gg.* Joint 2 of antennæ linear; membrane not rugose; third and fourth antennals united distinctly more than half as long as second.

- h.* Head vertical, viewed from above not prolonged in front of eyes; pronotum of male campanulate, sinuate at base, the humeral angles prominent; female usually brachypterous, the abdomen very broad.

VIII. MECOMMA, p. 852.

- hh.* Head declivent, viewed from above prolonged before the front margin of eyes; pronotum trapezoidal, humeral angles not abruptly prominent; sexes similar.

- i.* Head strongly compressed apically; vertex declivent behind, not margined at base, usually with a small pale spot each side; basal width of pronotum very little greater than width of head.

IX. CYRTORHINUS, p. 853.

- ii.* Head not distinctly compressed apically; vertex usually margined at base, when black never with a pale spot each side; base of pronotum distinctly wider than head.

- j.* Base of vertex carinate, sometimes obtusely so, the carina never beset with bristly hairs; beak usually reaching hind coxæ; xyphus moderately sulcate, its sides V-shaped.

X. ORTHOTYLUS, p. 854.

- jj.* Base of vertex not carinate, the basal margin beset with bristly hairs and with an alutaceous glabrous spot adjoining the eye each side; beak not passing hind margin of mesosternum; xyphus deeply excavated, its sides U-shaped.

XI. NOCTUOCORIS, p. 865.

I. GLOBICEPS LePeletier & Serville, 1825, 326.

Elongate, narrow, subparallel species (male) or suboval (female), having the head wider across eyes than long, its front vertical; beak reaching middle coxæ; antennæ shorter

than body, joint 1 stout, subcylindrical, 2 thickened toward apex, more so in female; pronotum elongate-trapezoidal, broader at base than long, otherwise as in key; scutellum triangular, equilateral, convex, with a transverse groove across basal third; elytra dimorphic, in macropterous male longer than abdomen, clavus deflexed to corium, the latter subconvex, cuneus long triangular, feebly deflected; hind tarsi with joint 2 longest, 1 shortest. Three species have been recorded from North America, two of them from our territory.

KEY TO EASTERN SPECIES OF GLOBICEPS.

- a.* Elytra of female reaching behind middle of abdomen with membrane short but distinct; second antennal thickened toward apex in both sexes; base of vertex margined in male, not margined in female.

915. FLAVOMACULATUS.

- aa.* Elytra of female reaching only base of third dorsal, devoid of clavus, cuneus and membrane; second antennal of male but slightly thickened toward apex; base of vertex not margined in either sex.

916. DISPAR.

915 (1161). GLOBICEPS FLAVOMACULATUS (Fabricius), 1794, 182.

Black, sparsely clothed with short silvery-white hairs; elytra with costal margin pale dull yellow, blackish at base; corium with a large triangular yellowish-white spot on basal half, and a dark brown band across apical fourth, cuneus with basal half yellowish-white; membrane blackish, iridescent, inner cell and spot near tip of cuneus whitish; legs reddish-brown, tibiæ and tips of femora usually paler. Joint 1 of antennæ brownish-yellow, as long as width of vertex; 2 black, male, paler at base, female, four times as long as 1; 3 and 4 piceous, 3 two-fifths the length of 3, twice as long as 4. Length, 5—6 mm.

(*British Mus. Coll.*). A palæarctic European species recorded in this country from Ontario and doubtfully from Pennsylvania, but Knight (1922, 281) states that these records require verification. Common in England in July on *Umbellifera* and amongst roots of grasses.

916 (—). GLOBICEPS DISPAR (Boheman), 1852, 72.

Male—Elongate, subparallel. Black, vertex often with a pale spot each side; clavus and apical half of corium pale fuscous, cuneus and basal half of corium pale translucent, the former with apex and inner margin dusky; membrane pale fuscous, cells whitish, iridescent, veins darker; legs straw-yellow, hind tibiæ and third joint of tarsi dusky; ventrals black, shining. Joint 1 of antennæ dull yellow, as long as width of vertex; 2 black, paler at base, four times as long as 1; 3 yellowish, dusky toward apex, three-fifths the length of 2; 4 fuscous, one-half as long as 3. Pronotum with disk strongly widened across humeral angles. Elytra

surpassing abdomen by one-half the length of membrane. *Brachypterus female*—Suboval. Black, shining; elytra whitish-translucent, with base and cross-bar on apical third fuscous. Head and abdomen subglobose. Second antennal strongly clavate. Elytra oblong, narrowed at base, their tips upcurved. Length, 3.2—4.3 mm.

Fritton and Gimingham, Norfolk, England, August (*British Mus. Coll.*). An introduced European species, known in this country from Glen House, N. Hamp.; Parry Sound, Ontario, and Colorado.

II. BLEPHARIDOPTERUS Kolenati, 1845, 107.

Elongate, narrow, somewhat delicate species having the head wider across eyes than long, its front vertical; beak reaching hind coxæ; antennæ longer than body; pronotum subcampanulate, broader at base than long, humeral angles elevated, hind margin concave; scutellum as in *Globiceps*; elytra entire, longer than abdomen, inner half of clavus flat, outer half deflexed to corium, cuneus long, triangular, feebly deflexed; hind tarsi with joints 2 and 3 subequal, 1 shorter. One palæarctic European species occurs in our territory.

917 (—). BLEPHARIDOPTERUS ANGULATUS (Fallen), 1807, 76.

Elongate, narrow, subparallel. Green or yellowish-green, fading to dull yellow, sparsely clothed with fine suberect dusky hairs; hind angles of pronotum black; elytra subtranslucent, clavus piceous along the commissure, its disk and that of corium with numerous minute dark green dots; membrane whitish-hyaline, iridescent, darker between tips of cells and apex, veins green; legs greenish-yellow, knees of tibiæ black, tarsi brown. Joint 1 of antennæ yellowish, base and sometimes apex black, two-thirds as long as head and pronotum united; 2 more than twice as long as 1, yellowish, with a black ring near base, apex brownish; 3 and 4 piceous-brown, 3 almost as long as 2, 4 one-third the length of 3. Length, 5—5.5 mm.

Cheshunt, England, Aug. 29 (*British Mus. Coll.*). Known in this country only from Halifax, Nova Scotia. Common in England on alders in July and August.

III. HETEROCORDYLUS Fieber, 1858, 316.

Elongate, rather robust species having the head triangular, slightly wider across eyes than apex of pronotum, its front declivent; beak reaching hind coxæ; antennæ shorter than body; eyes large, prominent; pronotum trapezoidal, sides straight, disk but slightly declivent from the base forward, hind margin truncate; mesoscutum exposed; elytra entire, sur-

passing abdomen, cuneus long, triangular, but little deflexed; hind tarsi with joints 2 and 3 subequal, 1 two-thirds the length of 2. One species occurs in our territory.

918 (1127). *HETEROCORDYLUS MALINUS* Reuter, 1909, 71.

Dark red to fuscous-black, thinly clothed with white closely appressed scales and very fine yellowish hairs. Males usually fuscous-black with basal angles of pronotum and elytra red, embolium and cuneus with a reddish tinge; antennæ, legs and under surface dark fuscous-brown, the ventrals tinged with reddish. Females usually with head, apical half of pronotum, scutellum, inner half of clavus and membrane fuscous-black, remainder of upper surface red; sometimes nearly wholly fuscous. Joint 1 of antennæ subclavate, subequal in length to width of vertex; 2 subfusiform, clothed with bristle-like hairs, three times longer than 1; 3 and 4 linear, clothed with short fine brown hairs, 3 two-fifths the length of 2, 4 one-half as long as 3. Last ventral of male with a deep V-shaped notch. Length, 5.7—6.5 mm. (Fig. 183).

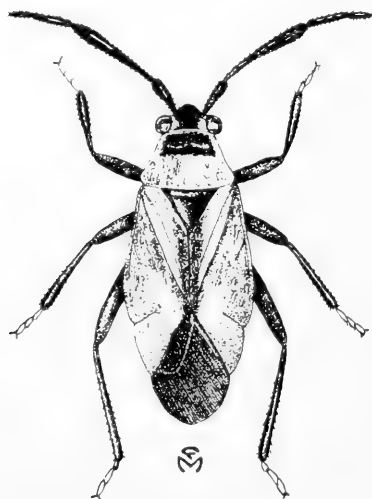


Fig. 183. Female, X 7. (Original).

Vermilion, Fountain, Marion and Harrison counties, Ind., May 10—June 17. Beaten in numbers from the flowers and foliage of the large-fruited thorn or red-haw, *Crataegus punctatus* Jacq. Henderson, Ky., June 1 (*Marshall*). Recorded only from New Hampshire, New York and Glen Ellyn, Ill. Occurs with *Lygidea mendax* Reut. on apple trees in New York, often doing much damage by deforming with their punctures a large proportion of the fruit.

IV. *HYALOCHLORIA* Reuter, 1907b, 18.

Small oval, greenish hyaline species having the head narrower than base of pronotum, its front vertical, truncate above, not produced in front of eyes; vertex broadly concave between the eyes and with an impressed median line, its basal margin curved, feebly carinate; antennæ very slender, pilose, half the length of body; pronotum subtrapezoidal, twice as wide at base as long, sides feebly sinuate, apex one-half the width of base, disk with a transverse impression behind the calli which are united at middle to form a preapical collar-like ridge, hind mar-

gin broadly concave, impressed each side near basal angles; scutellum triangular, convex, as long as pronotum with transverse groove in front of the exposed elevated mesoscutum; elytra entire, surpassing abdomen, conjointly oval, costal margin broadly curved; legs slender, tibiæ without spines, finely setose. One of the three known species occurs in Florida.

919 (1168¼). *HYALOCHLORIA CAVICEPS* Reuter, 1907b, 20.

Oblong-oval. Color uniform pale greenish- or greenish-yellow, shining, sparsely clothed with suberect yellowish hairs; eyes brown; apex of scutellum green; tarsal claws fuscous. Joint 1 of antennæ stout, yellow, about one-half as long as width of vertex; 2 greenish, usually fuscous at base and apex, one-fourth shorter than basal width of pronotum; 3 and 4 blackish, subequal in length, united about three-fourths the length of 2. Length, 2—2.2 mm.

Dunedin and Royal Palm Park, Fla., Dec. 1—April 8; swept from low roadside herbage. Described from Jamaica. Recorded heretofore in this country only from Biscayne Bay, Fla.

V. DIAPHNIDIA Uhler, 1895, 43.

Elongate, subelliptical, delicate, opaque species having the front of head subvertical, slightly longer than width of vertex, tylus projecting beyond the line of face, curving beneath; beak usually reaching hind coxæ, its basal joint shorter than under side of head; antennæ slender, nearly as long as body; pronotum trapezoidal, side margins almost straight, oblique, disk usually with a shallow impressed line behind the calli; elytra long and wide, nearly flat, subhyaline, the costal margin reflexed; abdomen very narrow. Four species are recorded from the eastern states.

KEY TO EASTERN SPECIES OF DIAPHNIDIA.

- a. Larger, length 4 or more mm.; head not black.
 - b. Beak reaching between front coxæ; color green or greenish-white; length, 5.5 mm. 920. *DEBILIS*.
 - bb. Beak reaching beyond middle coxæ.
 - c. Antennæ almost wholly greenish-white; length, 4—4.3 mm. 921. *PELLUCIDA*.
 - cc. Second antennal fuscous or black, third and fourth fuscous; length, 5 m. 922. *PROVANCHERI*.
- aa. Smaller, length 3—3.5 mm.; head black. 923. *CAPITATA*.

920 (1165). *DIAPHNIDIA DEBILIS* Uhler, 1895, 43.

Elongate-oblong. Uniform pale green or greenish-white; pronotum, sides of head and under surface minutely pubescent; beak yellowish, black at tip; legs pale green, tibiæ tinged with yellowish, their spines dark,

base and apex of tarsi piceous; ventrals silvery-greenish. Antennæ yellowish, joint 1 longer than head, stouter than 2, narrowed toward base; 2 cylindrical, as long as outer margin of corium. Pronotum one-third wider than long, disk flat, finely rugose, side margins feebly sinuate in front of humeral angles. Elytra minutely scabrous. Length, 5.5 mm.

Ranges from Ontario and New England west to Colorado and California. Host plant as yet unknown.

921 (1166). *DIAPHNIDIA PELLUCIDA* Uhler, 1895, 44.

Pale green fading to yellowish-white, sparsely clothed with very fine suberect whitish hairs; under surface and legs more yellowish, the genital region, tarsal claws and fourth antennal often tinged with fuscous. Joint 1 of antennæ longer than head, narrowed at base, 2 four times as long as 1, 3 two-thirds the length of 2, 4 one-third as long as 3. Pronotum one-third wider at base than long, calli rather prominent, with an impressed space between them, basal margin straight, hind angles subacute. Clavus and corium minutely scabrous. Length, 4—4.3 mm.

Washington, D. C., July 14 (*Gerhard*). Ranges from Quebec and New England west to the Pacific; in the east not recorded south of Maryland. Host plants, apple, hop hornbeam, maple, hazelnut and hickory. Van Duzee (1912a, 489) says that: "It seems to be common throughout the eastern United States and Canada. It occurs most frequently on hickory trees and has a most annoying habit of biting sharply should it land where the skin is wet with perspiration."

922 (1167). *DIAPHNIDIA PROVANCHERI* (Burque), 1887, 144.

Pale translucent greenish-yellow, sometimes with calli and basal half of pronotum in part vaguely brownish; tibiæ and tarsi usually lightly tinged with fuscous. Antennæ as in key, joint 1 dull yellow, slightly longer than width of vertex, 2 four times as long as 1, 3 three-fourths as long as 2, 4 one-third the length of 3. Length, 5 mm.

St. Anthony Park and Two Harbors, Minn., June 18—Aug. 20 (*Minn. Univ. Coll.*). Ranges from Quebec and New England west to California; in the east rarely found south of latitude 42°. Occurs on hickory, oak, willow, beech and yellow birch.

923 (1168). *DIAPHNIDIA CAPITATA* Van Duzee, 1912a, 490.

Pale greenish-yellow, translucent; head shining black, eyes brown or gray; membrane pale hyaline, feebly iridescent. Joint 1 of antennæ blackish-fuscous, as long as width of vertex, 2 brown, paler at middle, three and one-half times the length of 1. Head smaller, vertex relatively wider and more convex than in our other species. Beak reaching hind coxæ. Length, 3—3.5 mm.

Ottawa, Ont., July 2 (*Van Duzee*). Cloquet, Minn., Aug. 1

(*Minn. Univ. Coll.*). Recorded elsewhere only from New York. Breeds on witch hazel; occurs also on beech and yellow birch.

VI. REUTERIA Puton, 1875, 519.

Elongate-subparallel, pubescent species having the head porrect, wider across eyes than apex of pronotum, its front declivent, base of vertex not carinate; eyes large, coarsely granulated; beak reaching hind coxæ; antennæ moderately stout, shorter than body; pronotum trapezoidal, nearly as wide at base as long, sides straight, apex half the width of base, hind margin truncate, basal angles rounded; elytra entire, almost flat, surpassing abdomen; cuneus deflexed, fracture weak, legs long and slender. One species is known.

924 (1169). REUTERIA IRRORATA (Say), 1832, 25; I, 346.

Pale white; elytra and hind femora, when fresh, usually marbled with greenish-black spots; apical fourth of embolium and outer margin of cuneus usually more or less tinged with fuscous; tarsi fuscous-brown. Joint 1 of antennæ with black lines as in key, subequal in length to width of vertex; 2 pale straw-yellow, fuscous at base, three and a half times longer than 1. Commissure longer than scutellum. Entire upper surface sparsely clothed with long whitish hairs; costal margin ciliate with same. Length, 4.3—4.5 mm.

Staten Island, N. Y., Aug. 6 (*Davis*). Swannanoa, N. Car., July (*Brimley*). Described from Indiana. Ranges from Ontario and New York west to North Dakota, Iowa and Kansas and south to Maryland and North Carolina. Recorded also from Europe and Mexico. Breeds on linden and white oak.

VII. HETEROTOMA Latreille, 1829, 199.

Elongate, slender species having the head one-half wider across eyes than long, front vertical; antennæ shorter than body, joints 1 and 2 very strongly swollen, 3 and 4 filiform; eyes large, prominent, subglobose; beak reaching first ventral; pronotum trapezoidal, one-third wider at base than long at middle, declivent forward, calli distinct, sides feebly concave, not carinate, front angles rounded, hind ones acute; scutellum triangular, equilateral; elytra surpassing abdomen, clavus deflected to corium, cuneus long, triangular; joints of hind tarsi subequal in length. One species is known.

925 (1180½). HETEROTOMA MERIOPTERUM (Scopoli), 1763, 131.

Olive-gray or dark brown, thickly clothed with appressed whitish hairs and suberect darker ones; inner margin of clavus and costal mar-

gin of corium blackish, the latter ciliate; cuneus tinged with reddish, its outer margin fuscous; membrane blackish with a subtriangular white spot opposite tip of cuneus, veins reddish-brown; legs yellowish-white, joint 3 of tarsi and claws brown; ventrals black. Joints 1 and 2 of antennæ black, thickly pilose with black hairs; 1 cylindrical, as long as head, 2 fusiform, flattened on sides, stouter and three times longer than 1; 3 and 4 fuscous, pale at base, much more slender, united about one-half the length of 2, 4 three-fifths as long as 3. Pronotum finely transversely rugose. Length, 4.5—5 mm.

Horcham Road, Sussex and Muswell Hill, England, July—August (*British Mus. Coll.*). Recorded in this country only from Honeoye Falls, N. Y., where it was taken in a nursery. In England it is said to be common in summer on nettles and other plants along hedges.

VIII. MECOMMA Fieber, 1858, 313.

Elongate, sides subparallel, male, oblong-oval, female; head wider across eyes than long, vertex feebly convex, its base not carinate; beak reaching hind coxæ; eyes large, prominent; scutellum triangular, equilateral, with transverse channel near base; elytra of male entire, surpassing abdomen, clavus convex, corium flat; of female, short, reaching middle of abdomen, their tips rounded, the corium only present; hind tarsi with joint 2 longest, 1 shorter than 3.

But one species occurs in our territory, the records of *M. ambulans* (Fall.) from British America belonging to *gilvipes* (Stal), as pointed out by Knight.

926 (1188). MECOMMA GILVIPES (Stal), 1858, 187.

Male—Black, elytra in great part dull yellowish-translucent, feebly tinged with fuscous, clavus more strongly fuscous; membrane pale hyaline, veins pale brown; antennæ fuscous-brown, thickly pilose; legs dull yellow. Pronotum campanulate, broader at base than long, its hind margin slightly concave, exposing the mesoscutum. Elytra surpassing abdomen by the full length of membrane, their costal margins finely ciliate. *Female*—Black, shining; elytra dull yellow; legs pale straw-yellow. Antennæ as long as body, joint 1 and base of 2 yellow, remainder piceous; 1 as long as width of vertex, 2 three and one-half times as long as 1, feebly thickened toward apex; 3 three-fourths the length of 2, 4 three-fifths as long as 3. Pronotum subquadrate, front angles rounded, calli large, rather low, separated by a shallow fovea. Elytra obovate, reaching fourth dorsal, their tips broadly obliquely rounded. Length, male, 4.3—4.5 mm.; female, 2.7—3 mm. (Fig. 176, a).

Machias, Me., July 22; Wanakena, N. Y., Aug. 3 (*British Mus. Coll.*). Selkirk Mountains, British Columbia, Aug. 9 (*Minn.*

Univ. Coll.). Ranges from Ontario and New England west to the Pacific, north of latitude 42°. Occurs upon rank herbage in moist shaded locations.

IX. CYRTORHINUS Fieber, 1858, 313.

In addition to the characters given in generic key, the members of this genus have the beak reaching between middle coxæ; antennæ finely pilose, joint 1 three-fourths or more as long as width of vertex; elytra in both sexes entire, longer than abdomen in males, the cuneal fracture subobsolete. Two species occur in the eastern states.

KEY TO EASTERN SPECIES OF CYRTORHINUS.

a. Pronotum wholly black; elytra fuscous. 927. *CARICIS* var. *VAGUS*.

aa. Apical half of pronotum in part pale yellow; elytra sordid white.

928. *PYGMÆUS*.

927 (1186¼). *CYRTORHINUS CARICIS VAGUS* Knight, 1923, 511.

Elongate-oblong. Head, pronotum and scutellum black, shining; elytra a nearly uniform pale subhyaline fuscous, minutely and sparsely pubescent, embolium somewhat paler; clavus sometimes tinged with fuscous; legs greenish-yellow, coxæ and hind femora often in part fuscous. Antennæ fuscous-black, the incisure between joints 1 and 2 pale; joint 1 slightly shorter than width of vertex; 2 three times longer than 1; 3 two-thirds the length of 2, 4 one-third as long as 3. Pronotum minutely transversely rugose. Length, 2.8—3 mm.

Raleigh, N. Car., Aug. 10 (*Brimley*). Recorded elsewhere only from New York, New Jersey and Virginia. Knight (1917b, 250) first recorded this as the European *C. caricis* (Fall.), but later described it as a variety of that species. The typical *caricis* is known from Colorado and in Europe occurs amongst sedges in damp places.

928 (1186½). *CYRTORHINUS PYGMÆUS* (Zetterstedt), 1838, column 279.

Elongate, sides subparallel, male; suboval, female. Head black, shining; pronotum and scutellum fuscous, the former with area in front of and between calli dull yellow; elytra dull whitish-translucent; membrane pale hyaline, iridescent; legs straw-yellow; ventrals dull yellow with a fuscous stripe at sides. Joint 1 of antennæ as long as width of vertex, shining black, its apical fourth yellow; 2 fuscous-black, three times as long as 1; 3 and 4 dusky yellow, subequal in length, united one-third longer than 2. Upper surface sparsely clothed with very fine inclined dusky hairs. Elytra of male slightly surpassing abdomen; of female reaching sixth dorsal. Length, 3—3.2 mm.

Carmarthen and Poole Harbor, England, August (*British Mus.*

(Coll.). A European species which Van Duzee records as taken by Mrs. A. T. Slosson in Florida.

X. ORTHOTYLUS Fieber, 1858, 315.

Elongate-oval or oblong-oval species having the head wider across eyes than apex of pronotum, its front vertical; vertex with a basal carina and in front of it a depressed line or area; tylus prominent, its base usually on a line with base of antennæ; beak reaching beyond middle coxæ, its tip blackish; antennæ pubescent, shorter than body, basal joint stoutest, 3 and 4 setaceous; pronotum trapezoidal, rather flat, usually wider at base than long, sides straight, converging, basal margin feebly concave or straight; mesoscutum usually exposed; scutellum triangular, equilateral; elytra entire, surpassing abdomen, clavus deflexed toward corium, cuneus and membrane feebly deflexed, the latter 2-celled.

The North American species were monographed by Van Duzee in 1916. About 45 species are known from this country, 21 of which have been recorded from the eastern states. For convenience of study these are separated into two groups as follows:

KEY TO GROUPS OF EASTERN SPECIES OF ORTHOTYLUS.

- a. Ground color green or greenish-yellow, sometimes almost white, dark markings, if present, not clouding the elytra. GROUP A, p. 854.
- aa. Ground color pale brownish-yellow to black, sometimes greenish when immature, but the elytra, in that case, marked with fuscous or black. GROUP B, p. 859.

GROUP A.—ORTHOTYLUS.

This group comprises small, moderately elongate green or greenish-yellow species having the base of vertex sharply carinate; pronotum short, transverse; legs short. It includes eight of our eastern species.

KEY TO EASTERN SPECIES OF GROUP A, ORTHOTYLUS.

- a. Upper surface with two types of pubescence, viz., closely appressed scale-like hairs intermixed with longer inclined or suberect slender ones.
- b. Antennæ green or greenish-yellow; veins and cells of membrane green.
- c. Upper surface without patches of appressed black scales; color pale green or greenish-yellow; host plant, lamb's quarters, *Chenopodium album* L. 929. FLAVOSPARSUS.

- cc. Upper surface with numerous small scattered patches of appressed black scales; pronotum and elytra dark green; host plant, hollyhock, *Althæa rosea* Cav. 930. ALTHÆÆ.
- bb. Antennæ with joints 3 and 4 and apical half of 2 fuscous-brown; veins and cells of membrane pale brown. 931. CONCOLOR.
- aa. Upper surface with inclined or suberect pubescent hairs only.
- d. Smaller species, length not more than 4.5 mm.; first joint of antennæ shorter than head.
- e. Pubescence of upper surface blackish; antennæ and membrane wholly pale; host plant honey-locust, *Gleditsia triacanthos* L. 932. CHLORIONIS.
- ee. Pubescence of upper surface pale; apical half of antennæ fuscous; membrane pale, its veins green; host plant burdock, *Arctium minus* Schk. 933. TRANSLUCENS.
- dd. Larger species, length more than 4.5 mm.; first antennal as long as or longer than head.
- f. Basal joint of antennæ pale brownish-yellow; length, 5.5—6 mm. 934. UNIFORMIS.
- ff. Basal joint of antennæ brown or black; host plant, willow.
- g. Pubescence of upper surface fine; basal joint of antennæ brown; length, 5 mm. 935. VIRIDIS.
- gg. Pubescence of upper surface coarse, conspicuous; basal joint of antennæ black; length, 5.8—6.5 mm. 936. BASICORNIS.

929 (1172). ORTHOTYLUS FLAVOSPARSUS (Sahlberg), 1842, 411.

Oblong-oval. Pale green fading to greenish-yellow; head, calli and lower surface dull yellow; membrane slightly dusky, the cells and veins greenish; tips of tibiæ and tarsi brownish. Upper surface with pubescence as in key, in fresh specimens the pale buff scale-like hairs often forming small spots on elytra. Vertex flat with a median depression in front of basal carina, this more conspicuous in male. Pronotum twice as wide as long, its basal margin straight. Elytra surpassing abdomen by less than one-half the length of membrane. Length, 4—4.2 mm.

Marion Co., Ind., June 12—Aug. 22; swept from lamb's quarters, grasses and other herbage along railway embankments and roadsides. Cape Sable, Fla., Feb. 22; not before recorded from that State (*H. S. B.*). Swannanoa, N. Car., July (*Brimley*). A European species ranging in this country from Quebec and New England west to the Dakotas and Kansas and south-west to Virginia and Florida. Occurs mainly on *Chenopodium*.

930 (—). ORTHOTYLUS ALTHÆÆ Hussey, 1924, 165.

Oblong-oval. Head, front lobe of pronotum and legs dull yellow; hind lobe of pronotum and elytra dark green; membrane pale dusky translucent, the veins whitish; under surface greenish-yellow; tarsal claws fuscous. Pubescence as in key, the blackish, scale-like hairs conspicuous and scattered over the entire upper surface. Joints 1 and 2 of antennæ dull yellow, 1 slightly longer than width of vertex, 2 nearly

four times as long as 1; 3 in part and 4 fuscous, 3 one-eighth shorter than 2, 4 one-half as long as 3. Pronotum twice as wide as long, calli very prominent, front angles with a long seta directed outward and forward. Elytra but slightly passing tip of abdomen. Length, 3.5—3.8 mm.

Lafayette, Ind., May 15; taken from hollyhock. Known as the "hollyhock bug." Recorded only from Michigan. Hussey found it common at Ann Arbor, June to late September; all stages occurring on the upper side of the leaves of hollyhock and doing serious damage thereto. Originally described^{ss} by A. J. Cook as *Orthotylus delicatus* Uhler (Ms.), which name was preoccupied.

931 (—). *ORTHOTYLUS CONCOLOR* (Kirschbaum), 1855, 315.

Elongate, sides subparallel. Bluish-green, thickly clothed with fine short silvery appressed hairs, intermixed with numerous inclined stouter blackish ones; head and apical third of pronotum fading to dull yellow; membrane uniformly pale brownish-hyaline, iridescent, veins yellowish to dusky; legs yellowish-green, third joint and claws of tarsi piceous. Joint 1 of antennæ greenish, three-fourths as long as width of vertex; 2 yellowish, brownish toward apex, three and a half times as long as 1; 3 and 4 dark brown, 3 three-fourths as long as 2, 4 one-third the length of 3. Length, 4.2—4.6 mm.

Herefordshire, England, Aug. 13 (*British Mus. Coll.*). A European species recorded in this country only from Massachusetts. Somewhat larger and stouter than *flavosparsus* and without small yellow pubescent spots on elytra.

932 (1173). *ORTHOTYLUS CHLORIONIS* (Say), 1832, 25; I, 346.

Elongate-oval. Pale green or greenish-yellow, fading to straw-yellow; above sparsely clothed with short inclined blackish hairs; legs and antennæ concolorous; membrane pale, the veins only greenish. Joint 1 of antennæ as long as width of vertex, 2 three and a half times as long as 1, 3 two-thirds the length of 2, 4 two-fifths as long as 3. Vertex convex, with basal carina prominent. Calli not conspicuous. Elytra surpassing abdomen by one-half the length of membrane. Length, 3.5—4 mm. (Fig. 184).

Marion and Vigo counties, Ind., June 3—July 15; frequent on leaves of the host plant, the thorn or honey-locust. Described from Indiana. The known range extends from Quebec and New England west to Indiana. Recorded also from California. Specimens are at hand, identified for me by Uhler as *O. alternatus* Uhler (Ms.). It is more robust than *flavosparsus*, from which it may be separated by the concolorous cells of membrane and lack of patches of pale pubescence; from *uniformis*

^{ss}Bull. 76, Mich. Agr. Coll. Exp. Stat., 1891, 10.



Fig. 184, X 14. (After Forbes).

by the smaller size and shorter elytra and from *translucens* by the suberect dark hairs of upper surface. Forbes in his Tenth Illinois Report (1909, 90) calls it the "green leaf-bug," and says it is "very common in July on the sugar beet in Illinois, causing a whitish mottling of the leaves. It is to some extent nocturnal and has been taken at electric lights."

933 (1174). *ORTHOTYLUS TRANSLUCENS* Tucker, 1907, 58.

Clear green, head, calli, scutellum and under surface tinged with yellowish; upper surface sparsely clothed with pale hairs; membrane dusky, iridescent, veins pale green; elytral nervures, outer margin of cuneus and knees dark green. Joint 1 of antennæ greenish-yellow, shorter than head; 3 and 4 and apical half of 2 fuscous; 2 about as stout as 1, nearly four times longer. Head shorter and more vertical than in allied forms. Pronotum about twice as wide at base as long at middle, calli not prominent. Mesoscutum rather broadly exposed. Elytra surpassing abdomen by half the length of membrane. Length, 4 mm.

Henderson, Ky., April 30 (*Marshall*). Recorded from Buffalo and Elma, N. Y., and Colorado.

934 (1173½). *ORTHOTYLUS UNIFORMIS* Van Duzee, 1916b, 100.

Elongate-oval. Color a nearly uniform greenish-yellow, rather thickly clothed with short pale hairs; joints 3 and 4 of antennæ fuscous-brown;

head, calli, legs and lower surface somewhat paler; membrane pale translucent, strongly iridescent, veins green; tips of tarsi and of beak black. Head more pointed than in allied forms. Beak reaching between hind coxæ. Pronotum subdepressed, sides strongly oblique, feebly concave, the disk therefore much narrowed in front, transverse impression behind calli conspicuous. Apex of abdomen scarcely reaching base of cuneus, male; almost reaching its tip, female. "Dextral hook of male genital short, straight, ligulate, its tip incurved and subacute; sinistral hook long, curved in almost a semicircle, its apex slender, acuminate." Length, 4.8—6 mm.

Lake Tahoe, Cal. (type locality), July 19 (*Van Duzee*). Recorded also from Salamanca, N. Y., and Phoenix, Ariz. Host plant unknown.

935 (1175 $\frac{1}{8}$). *ORTHOTYLUS VIRIDIS* Van Duzee, 1916b, 103.

Elongate, sides subparallel. Color a nearly uniform green; head, front lobe of pronotum, scutellum, legs and under surface usually rather strongly tinged with yellow; costal margin often whitish; membrane whitish-hyaline, lightly tinged with fuscous, veins yellowish or pale green; tips of tarsi blackish. Joints 1, 3 and 4 of antennæ pale to fuscous-brown, 2 yellowish; 1 as long as width of vertex, 2 three and a half times as long as 1, 3 three-fourths the length of 2, 4 one-third as long as 3. Eyes very large, globose. Beak reaching middle coxæ. Basal carina of vertex straight, acute. Pronotum much narrowed in front, its length two-thirds its basal width; calli large, not prominent. Length, 4.6—5 mm.

Guilford, Conn., July 13 (*Walden*). Ranges from that state west to South Dakota and south to North Carolina. Breeds on willow.

936 (—). *ORTHOTYLUS BASICORNIS* Knight, 1923, 515.

Elongate-oval. Head, beak, front lobe of pronotum, tip of scutellum and legs dull yellow; hind lobe of pronotum, elytra and under surface pale green fading to greenish-yellow; membrane pale translucent, the veins greenish; tip of beak, joints 1 and 3 of tarsi and claws, fuscous-brown; upper surface, including costal margins, with conspicuous pubescence of rather long and coarse inclined yellowish hairs. Joint 1 of antennæ fuscous-brown to blackish, slightly longer than width of vertex; 2 pale reddish-brown, three times as long as 1; 3 and 4 fuscous-brown, 3 one-half the length of 2, 4 three-fifths as long as 3. Pronotum with calli prominent, merged at middle to form a wide collar-like ridge in front of the transverse impression. Length, 5.8—6.5 mm.

Marion Co., Ind., June 19—July 15; beaten in numbers from its host plant, the sandbar willow, *Salix fluviatilis* Nutt. The known range extends from Quebec and New York west to Minnesota and Illinois, but the distribution is probably coextensive with its host plant.

GROUP B.—ORTHOTYLUS.

Usually elongate, slender, subparallel species having the base of vertex sharply carinate and with a bi-impressed concavity between the base of eyes; pronotum about as long as broad; legs long and slender. Color usually pale brownish-yellow or reddish-yellow, with more or less fuscous or blackish, the elytra typically having the clavus and apical half of corium in part fuscous or black. To this group belong 13 of our eastern species of the genus.

KEY TO EASTERN SPECIES OF GROUP B, ORTHOTYLUS.

- a. Form oblong-ovate; color a nearly uniform whitish- or pale brownish-yellow; elytra translucent; head and calli yellowish; host plant, marsh cudweed, *Gnaphalium uliginosum* L. 937. CATULUS.
- aa. Form more elongate, sides subparallel; elytra with fuscous areas, or at times nearly black.
 - b. Color pale testaceous, elytra translucent with dark markings faint, almost wanting in female; median line of head and scutellum, side margins of pronotum and sides of under surface black; host plant American aspen, *Populus tremuloides* Michx. 938. CANDIDATUS.
 - bb. Ground color sometimes pale greenish- or yellowish, but dark markings of elytra always distinct.
 - c. Upper surface brownish-black, the elytra with only the embolium, narrow base of corium and nerves of commissure pale; median line or spot of pronotum and sometimes of scutellum pale; length, 6.8—7 mm.; host plant, yellow birch, *Betula lutea* Michx. 939. NECOPINUS.
 - cc. Elytra in female with more than embolium and slender base of corium pale; in male sometimes nearly wholly black; length usually less than 6 mm.
 - d. Pronotum with side margins black, disk broadly pale or reddish-yellow, sometimes with only the median line pale.
 - e. Disk of pronotum and sometimes the elytra in part, fulvous or reddish-yellow.
 - f. Elytra black, the female with a broad pale stripe extending the full length of corium and connecting with the pale cuneus; legs fulvous, apical half of hind femora blackish; length, 5.4 mm.; host plant, balm of gilead, *Populus candicans* Ait. 940. KNIGHTI.
 - ff. Elytra chiefly fulvous or salmon colored, blackish each side of commissure and on embolium; length, 4.7 mm.; host plant, black locust, *Robinia pseudacacia* L. 941. SUBMARGINATUS.
 - ee. Disk of pronotum with pale or greenish.
 - g. Pronotal disk broadly pale; scutellum black; membrane and apical half of cuneus dark fuscous; clavus and a broad transverse band across apex of corium, fuscous-black; length, 5.5—6 mm. 942. CRUCIATUS.

- gg.* Pronotal disk not so broadly pale; general color black or fuscous-black.
- h.* Embolium and outer margin of corium pale greenish translucent.
- i.* Pronotum and scutellum without a pale median line; length, 5.5 mm.; host plant, willow. 943. *MARGINATUS*.
- ii.* Pronotum with a pale median line extending from its apex to tip of scutellum; length, 6 mm.; host plants, thorn, *Cratægus*, and apple. 944. *SERUS*.
- hh.* Corium blackish at outer margin except at base; scutellum black, rarely pale at middle; length, 5.6—6 mm.; host plant, smooth alder, *Alnus rugosa* (Du Roi). 945. *ALNI*.
- dd.* Pronotum of female with side margins pale or greenish, disk usually in part blackish, often with median line pale; of male sometimes almost wholly blackish.
- j.* Hind femora blackish except at base; scutellum broadly pale; upper surface in great part blackish, the paler parts tinged with reddish; length, 5.6—6 mm.; host plant, brittle willow, *Salix fragilis* L. 946. *ORNATUS*.
- jj.* Hind femora greenish; scutellum sometimes broadly pale, but then the femora not dark.
- k.* Pronotal disk transversely pale behind calli; calli and basal margin of disk brown or blackish, disk sometimes wholly pale; length, 4.5 mm.; host plant, brittle and black willows. 947. *MODESTUS*.
- kk.* Pronotal disk almost wholly black, male; with blackish rays each side of median line, connecting calli with basal margin, female; host plant, black willow.
- l.* Smaller, length 5.2 mm.; veins of membrane paler than the disk; corium with inner apical half fuscous, the pale color of basal half extending along claval suture. 948. *DORSALIS*.
- ll.* Larger, length 5.8—6 mm.; veins and disk of membrane a uniform dusky; pale color of basal half of corium not extending along claval suture to separate black of corium from that of clavus. 949. *NEGLECTUS*.
- 937 (1175½). *ORTHOTYLUS CATULUS* Van Duzee, 1916b, 106.

Elongate-oval. Pale grayish-yellow, elytra often tinged with brownish or fuscous, head and calli with yellowish; upper surface thickly clothed with pale to dusky pubescence; membrane dusky hyaline, veins whitish; tips of tarsi and beak black. Antennæ slightly dusky apically, joint 1 scarcely half as long as width of vertex, 2 nearly as stout as and three times longer than 1. Beak reaching first ventral. Vertex flat in front of the obtuse basal carina. Pronotum with sides straight, front margin concave, calli large, not prominent. Elytra surpassing abdomen by nearly the length of membrane; costal margin feebly but distinctly curved. Length, 4.2—4.5 mm.

Hamburg, N. Y., June 6 (*Van Duzee*). Definitely recorded only from Maine, Connecticut and New York. Occurs on cudweed in woodland pastures. "The pale testaceous color of this insect gives it the appearance of being immature." (*Van Duzee*).

938 (1178¼). *ORTHOTYLUS CANDIDATUS* Van Duzee, 1916b, 124.

Elongate, sides subparallel. Color as in key, clothed with minute pale pubescence; head and antennæ tinged with fulvous, pronotum, scutellum and legs with yellow; elytra whitish-yellow, subhyaline, with a vague fuscous line inside the principal vein; membrane slightly fuscous, cell milky-hyaline, veins brownish; tips of tibiæ and tarsi fuscous. Antennæ wholly black, male; joint 1 blackish, 2 reddish-brown, female, its apex and all of 3 and 4 fuscous. Vertex with basal carina prominent. Eyes large, oval. Beak reaching base of middle coxæ. Pronotum with calli large, their inner margins subcontiguous and basal ones bounded by a slightly curved conspicuous transverse impressed line. Length, 4.3—5 mm.

Two Harbors, Minn., Aug. 9 (*Minn. Univ. Coll.*). Described from Mt. Washington, N. Hamp. Taken in Minnesota only on aspen growing on the edge of bluffs bordering Lake Superior.

939 (1178½). *ORTHOTYLUS NECOPINUS* Van Duzee, 1916b, 125.

Elongate-oval. Head with front black, vertex with base, median line and elongate spot each side adjoining eye, greenish;; antennæ black, apical joints paler; pronotum with front margin and middle of basal half pale or greenish, rarely wholly black; color of elytra as in key; membrane fuscous, veins and a mark near apex of cuneus paler; beak and legs pale brownish-yellow, tarsi blackish; ventrals shining black with median whitish stripe. Eyes very large and prominent. Vertex strongly flattened, the basal carina prominent. Beak reaching base of middle coxæ. Pronotum much narrowed in front, two-thirds as long as wide at base, sides concave, disk flattened, basal half finely transversely rugose, calli small but prominent, hind margin broadly concave. Mesoscutum moderately exposed. Elytra gradually feebly widened from base to cuneus. Length, 6.6—6.8 mm.

Whiteface Mt. trail, N. Y., July 6 (*Davis*). Fairbault, Minn., June 12 (*Minn. Univ. Coll.*). Recorded only from Mt. Washington, N. Hamp., and Buffalo, N. Y. Breeds on yellow birch. Readily known by the large size and dark fuscous-brown color.

940 (1179⅝). *ORTHOTYLUS KNIGHTI* Van Duzee, 1916b, 121.

Elongate, slender, sides subparallel. Fuscous-black, sparsely clothed with very fine prostrate yellowish hairs; male with a small median spot on hind lobe of pronotum and a vague narrow stripe along the outer margins of basal half of corium, dull yellow; female more robust with pale spot and stripe conspicuous, the former covering most of pronotal disk and more or less of the calli, the elytra as in key; membrane translucent fuscous, paler near tips of cuneus; lower surface of head, beak

except tip, coxæ and femora dull yellow; tibiæ, tarsi and apex of hind femora fuscous-brown. Antennæ fuscous-black; joint 1 as long as width of vertex plus one eye; 2 three times as long as 1, 3 one-third the length of 2, 4 one-third as long as 3. Vertex with a distinct concavity in front of basal carina. Eyes large, prominent, in male as wide as vertex. Pronotum much narrowed in front, the calli prominent. Elytra long, slender, in male slightly tapering from base to cuneus. Length, 5.2—5.4 mm.

Attica, N. Y., July 6 (*Gerhard*). Known only from that State. Occurs on willow and balm of gilead.

941 (1178). *ORTHOTYLUS SUBMARGINATUS* (Say), 1832, 23; I, 344.

Pale salmon-yellow; front of head with a shining black spot on cheeks and base of tylus; antennæ blackish, basal joint paler; sides and flanks of pronotum broadly black; apex of scutellum fuscous; elytra each with a stripe bordering commissure and usually a subcostal line, blackish, cuneus pale, its tip fuscous; membrane fuscous-hyaline; legs pale, hind tibiæ fuscous to black, joint 3 and claws of tarsi fuscous; ventrals pale, a broad fuscous stripe each side. Vertex depressed, basal carina prominent. Pronotum subconvex, slightly declivent, hind lobe transversely strigose. Mesoscutum exposed. Elytra surpassing abdomen by three-fifths the length of membrane. Length, 4—4.6 mm.

Ithaca, N. Y., July 7 (*Minn. Univ. Coll.*). Described from Indiana. Recorded from New England, New York and Missouri. Occurs in July and August on black locust and its range probably coextensive with that of its host plant.

942 (1179 $\frac{3}{8}$). *ORTHOTYLUS CRUCIATUS* Van Duzee, 1916b, 119.

Elongate, sides subparallel. Color as in key, sparsely clothed with short pale hairs; head black, shining, vertex usually with dot near each eye and often a basal spot paler; pronotum with calli and submarginal stripes black; mesoscutum fulvous; elytra whitish with dark markings as in key; legs pale brownish-yellow, femora paler at base, tips of tarsi black; under surface pale with a broad black stripe each side and on genital. Joints 1 and 2 of antennæ fuscous-black, 1 slightly longer than head, 2 four times as long as 1; 3 and 4 brown or dusky yellow, united three-fourths the length of 2, 3 twice as long as 4. Vertex feebly depressed, its basal carina low. Eyes very large, much wider than vertex. Pronotum long, nearly flat; calli large, feebly elevated. Cuneus narrow, acute, twice as long as its basal width. Tip of abdomen reaching base of cuneus, male, nearly to its middle, female. Length, 5.5—6 mm.

Wyandanch, Long Island, N. Y., June 20 (*Olsen*). Ashland, Mass., May 2 (*Frost*). Known elsewhere only from Quebec and New England. Host plant as yet unrecorded. "Readily known by the black lateral margins of pronotum and conspicuous cruciate black markings on elytra." (*Van Duzee*).

943 (1177). *ORTHOTYLUS MARGINATUS* (Uhler), 1895, 43.

Black, sparsely clothed with pale appressed hairs; costal margin of elytra, legs and middle of ventrals pale greenish-yellow; female with pale color of elytra sometimes encroaching upon the base of claval suture and veins of corium; cuneus yellowish, its inner angle fuscous; membrane blackish, veins pale at apex; legs pale greenish, tibiæ and tarsi with tips darker; ventrals, except along middle, black. Antennæ black, reaching cuneus, joint 1 stouter than 2, longer than head; 2 as long as clavus; 3 and 4 more slender, 3 one-half as long as 2, twice as long as 4. Beak reaching tips of middle coxæ. Vertex but little flattened, its carina sharp and high. Pronotum three-fifths as long as wide at base, sides distinctly sinuate; calli large, prominent, not united in front; basal half of disk finely transversely rugose. Apex of abdomen reaching middle of cuneus, male, nearly to its tip, female. Length, 5—5.5 mm.

Quinze Lake, Quebec, and Hamburg, N. Y., June 14—Aug. 15 (*Van Duzee*). Described from Colorado. Not recorded elsewhere.

944 (—). *ORTHOTYLUS SERUS* Van Duzee, 1921, 131.

Closely allied to *marginatus*. Differs by characters given in key and by having the pale costal stripe on elytra broader, its inner margin straight in both sexes; cuneus dull yellow, inner half largely fuscous; membrane pale fuscous with pale spot near apex of cuneus, its veins wholly dark. Vertex distinctly flattened, its basal carina obtuse. Pronotum with front of calli connected by an elevated line; basal half of disk finely transversely strigose. Beak reaching middle of hind coxæ. Length, 6 mm.

Salamanca, N. Y., July 24 (*Van Duzee*). Batavia, N. Y., July 5 (*Minn. Univ. Coll.*). Recorded elsewhere only from Hamburg, Gowanda and Colden, N. Y. Host plants as in key.

945 (—). *ORTHOTYLUS ALNI* Knight, 1923, 521.

Black; narrow line along side margins of eyes, narrow median stripe on basal half of pronotum, stripe bordering radial vein to beyond middle of corium and spot at base of cuneus, dull yellowish-translucent; membrane and veins uniformly dark fuscous; legs dark green, knees, tarsi and tips of tibiæ blackish. Joints 1 and 2 of antennæ black, 3 and 4 fuscous; 1 as long as width of vertex plus one eye, 2 three times as long as 1, 3 two-fifths the length of 2, twice as long as 4. Female with cuneus and base of embolium more broadly translucent. Length, 5.6—6 mm.

Beaver Bay, Minn., Aug. 20 (*Minn. Univ. Coll.*). Recorded only from Eastport, Me., and New York. Host plant as in key.

946 (1179%). *ORTHOTYLUS ORNATUS* Van Duzee, 1916b, 122.

Male—Elongate, sides subparallel, rather robust. Fuscous-black, rather thickly and very finely pubescent; cheeks, base of vertex, narrow side margins of pronotum, tip of scutellum, cuneus and basal half of corium, dull yellow; membrane pale fuscous, veins and spot on apical half

paler; legs dull yellow, the tarsi and hind femora darker; under surface dark brown, the genital region paler. Antennæ fuscous-brown, apex of joint 2 darker; joint 1 as long as head, 2 three and a half times longer than 1, 3 and 4 united about two-thirds the length of 2. Eyes very large, coarsely granulated. Pronotum relatively broad, calli large, rather low, hind lobe moderately convex, distinctly shagreened. Elytra broad, surpassing abdomen by one-half the length of membrane. *Female*—Color as in key, the broad side margins and median line of pronotum and basal half of both corium and clavus dull greenish-yellow. Membrane surpassing abdomen by only one-fourth its length. Length, 5.6—6 mm.

Honeoye Falls, N. Y., June 27 (*Davis and Gerhard*). Recorded only from Connecticut and New York, occurring on brittle-willow. "The large size and maculated membrane will distinguish this species. It has somewhat the aspect of *Lopidea cuneata* Van D. or of a *Plagiognathus*." (*Van Duzee*).

947 (1175%). *ORTHOTYLUS MODESTUS* Van Duzee, 1916b, 109.

Female—Elongate-oval. Pale green to yellowish, deeper green along the claval suture; upper surface with gray pubescence; head tinged with fulvous, a brown dot at base of tylus; pronotum with a lunate brown or fuscous spot behind each callus, these often united to form a transverse stripe, the hind margin with a broader fuscous bar; mesoscutum fulvous; clavus, except at base and apex, and a large spot on inner apical angle of corium fuscous; membrane fuscous, veins pale, their base darker; legs and under surface pale tinged with greenish, tips of tarsi dark. *Male*—Sides subparallel, color mostly black. Joint 1 of antennæ black, 2 brown, paler at base, 3 and 4 fuscous. Pronotum with sides nearly straight, surface transversely rugose; calli low, ill defined. Abdomen passing tip of cuneus. Tibial spines longer than in allied species. Length, 4.5—5 mm.

Batavia, N. Y., July 19 (*Minn Univ. Coll.*). Known only from New York and Pennsylvania, where it breeds on willow. A variety *immaculatus* Knight, uniformly green with only the membrane fuscous, is known from New York and Ottawa, Ontario.

948 (1176). *ORTHOTYLUS DORSALIS* (Provancher), 1872, 104.

Male—Elongate, subparallel. General color black, median line of pronotum often paler; cuneus, embolium, base and a ray along radial vein of corium, greenish-translucent; membrane fuscous, veins paler; legs green, coxæ paler. *Female*—More suboval. Pale green to greenish-yellow with pale and dark markings as in key, under surface in both sexes with a black stripe along sides. Antennæ black, male, tinged with fuscous, female; joint 1 as long as head, 2 three and one-half times as long as 1, 3 three-fifths the length of 2, 4 one-half as long as 3. Vertex but slightly broader than eye, male, nearly twice as broad, female. Pronotum much narrowed in front, its length two-thirds its basal width, sides distinctly sinuate, disk vaguely transversely rugose; calli large, oval, prominent, connected in front, well separated by a depressed area

behind middle. Tip of abdomen reaching apex of cuneus. Length, 5—5.5 mm.

White Plains, N. Y., June 29 (*Olsen*). Ranges from Quebec and New England west to New York. Host plant, willow.

949 (—). *ORTHOTYLUS NEGLECTUS* Knight, 1923, 515.

Male—Elongate, subparallel. Fuscous-black, sparsely clothed with very fine prostrate yellowish hairs; narrow side margins of pronotum, cuneus, embolium, outer margin of basal two-thirds of corium, legs, beak and middle of under surface greenish-yellow; sides of under surface shining brown; tips of beak and tarsi fuscous. Joint 1 of antennæ reddish-brown, nearly as long as head; 2 greenish-yellow, more than three times as long as 1; 3 and 4 tinged with fuscous, united three-fourths the length of 2. Pronotum with sides feebly but visibly sinuate; calli broad and low, united in front, separated by a median depression behind; disk transversely rugose. Elytra long, narrow, with sides parallel, but slightly surpassing tip of abdomen. *Female*—More robust and more broadly pale, the pronotum and scutellum with median line pale. Length, 5.2—5.8 mm.

Marion Co., Ind., June 12; beaten from black willow, *Salix nigra* Marsh: Port Credit, Ontario, July 1 (*Olsen*). Known heretofore from Nova Scotia, New England and New York. Very close to *dorsalis* and may prove to be only a color variety of that species.

XI. *NOCTUOCORIS* Knight, 1923, 523.

Differs from *Orthotylus* mainly by the characters given in generic key. Upper surface clothed with appressed scale-like hairs intermixed with more erect slender ones; head distinctly oblique, female, much less so, male; pronotum moderately sloping, almost flat, sides nearly straight, calli convex, delimited behind by an impressed line which merges with an impression between them; ventrals 1—6 each with an impressed glabrous spot on sides near spiracles; legs long, suggesting *Phytocoris*, but femora not distinctly broader at base.

950 (1178%). *NOCTUOCORIS FUMIDUS* (Van Duzee), 1916b, 127.

Elongate, subparallel, male, slightly larger and more robust, female. Color a uniform fuscous-brown; head, apex of pronotum and base of legs often tinged with rufous; tip of scutellum pale; membrane fuscous, nerves of the small cell pale; front face of femora with an interrupted fuscous line; upper margin and posterior face with a row of small dark spots; sterna fuscous, sides of ventrals with a black stripe. Joint 1 of antennæ brown, as long as width of vertex; 2 brownish-yellow, fuscous at tip, three times as long as 1; 3 and 4 fuscous, 3 three-fifths as long as

2, 4 one-third the length of 3. Front of head vaguely transversely striate. Mesoscutum narrowly exposed. Abdomen reaching tip of cuneus. Length, 5.7—6 mm.

St. Anthony Park, Minn., and Brookings, S. Dak., June 25 (*Minn. Univ. Coll.*). A species apparently of northern distribution, ranging from New York and Pennsylvania west to the Dakotas and Colorado. Taken mainly at light in July and August. Host plant unknown.

Subfamily IV. BRYOCORINÆ Douglas & Scott, 1865, 28, 276.

Small oval or oblong-oval, shining species having the head short, inserted in thorax to eyes, its front vertical or nearly so, vertex without a basal margin; antennæ slender, filiform, nearly as long as body, separated at base by a distance less than width of vertex; pronotum trapezoidal or subcampanulate, constricted at apical third, usually without a collar, disk punctate, hind portion convex, often strongly so; scutellum small, triangular, much shorter than the commissure; elytra usually entire, clavus strongly deflexed toward corium, membrane one-celled; hind femora short, not swollen; tibiæ without spines. Other characters as in subfamily key, p. 663.

Our species are few in number, but often abundant in individuals. They occur, for the most part, on ferns growing in wet places (whence the subfamily name) or on herbage in dense woodland. Representatives of six North American genera are known from the eastern states.

KEY TO EASTERN GENERA OF BRYOCORINÆ.

- a. Form shorter, ovate or subovate; sides of elytra more or less curved.
- b. Pronotum without a distinct collar, its hind lobe convex, sometimes strongly so.
- c. Scutellum with a triangular discal impression; pronotum densely, finely punctate.
- d. Basal joint of antennæ scarcely three-fifths as long as width of vertex, inserted close to apex of eye; head and pronotum dull red; elytra not flecked with pubescent spots.
- I. HALTICOTOMA, p. 867.
- dd. Basal joint of antennæ as long as width of vertex, inserted above and behind apex of eye; head and pronotum black; elytra flecked with pubescent spots.
- II. CYRTOCAPSUS, p. 867.
- cc. Scutellum without a triangular discal impression; pronotum coarsely and densely punctate; elytra without pubescent spots.
- e. Hind lobe of pronotum strongly convex and usually with a deep median impression; embolium broadly flattened, its width as great as that of hind femora.
- III. PYCNODERES, p. 868.

ee. Hind lobe of pronotum moderately convex, without a median impression; embolium linear, somewhat thickened.

IV. SIXENOTUS, p. 871.

bb. Pronotum with a distinct collar, its hind portion but moderately convex, sparsely punctate; basal antennal shorter than width of vertex.

V. MONALOCORIS, p. 874.

aa. Form elongate-oblong; sides of elytra parallel or nearly so; second joint of antennæ not longer than width of head across eyes; pronotum with a distinct collar.

VI. SYSINAS, p. 875.

I. HALTICOTOMA Reuter, 1913a, 278.

Small oval, thinly pubescent species having the head broader across eyes than long; eyes sessile, adjacent to and overlapping front angles of pronotum, vertex very wide; pronotum trapezoidal, twice as wide at base as long at middle, hind angles broadly rounded, hind margin subtruncate; mesoscutum concealed; scutellum with sides elevated, the disk therefore with a deep triangular concavity which is carinate along the middle; elytra entire, surpassing abdomen. One species is known.

951 (1073). HALTICOTOMA VALIDA Reuter, 1913a, 279.

Short, oval. Head, pronotum, base of scutellum, sterna and legs dull red or reddish-brown; elytra blue-black; membrane dusky-hyaline, veins brown. Ventrals reddish at middle, piceous on sides. Antennæ dark brown, joint 1 three-fifths as long as width of vertex, 2 twice as long as 1. Length. 3—3.5 mm.

Dunedin, Fla., March 15; one specimen swept from flowers of Adam's needle, *Yucca filamentosa* L. A southwestern species abundant on *Yucca* in Texas, New Mexico and Arizona, but not before recorded east of the Mississippi.

II. CYRTOCAPSUS Reuter, 1876, 78.

Oblong-oval, pubescent species having the head as wide at base as long, its front subvertical; tylus small, compressed, longer than cheeks; eyes large, oblong, widely separated; beak reaching middle coxæ; pronotum with base two-thirds wider than apex, disk moderately convex, sides sinuate, calli large, low, with a deep depression between and behind them; elytra entire, subdepressed, corium much widened toward apex, embolium rather wide and thick, cuneus as wide at base as long, strongly deflexed; membrane surpassing abdomen by more than half its length. One species is known.

952 (1072). CYRTOCAPSUS CALIGINEUS (Stal), 1859a, 258.

Oblong-oval. Black, subopaque, thickly clothed with short yellowish or grayish pubescence, which is condensed to form small spots on

elytra; corium often in great part brown, cuneus velvety-black; membrane hyaline-white, fuscous at base, veins and cells blackish; legs whitish-yellow, tibiæ and beak tinged with yellow. Joints 1 and 2 of antennæ pale yellow, 1 one-tenth shorter than width of vertex; 2 one-half longer than 1, slightly thickened toward apex; 3 and 4 fuscous-brown, 3 three-fourths the length of 2, 4 slightly longer than 2. Pronotum as under genus heading, its front portion declivent; disk thickly and evenly punctate, and with a subbasal impression near each humeral angle. Mesoscutum convex, narrowly exposed. Length, 2.7—3.1 mm.

Royal Palm Park, Hillsboro Canal and Dunedin, Fla., Nov. 18—April 3; swept from low herbage and beaten from cedar and moonvine along the borders of moist hammocks. Recorded from Crescent City, Fla.; also from California. A neotropical species ranging south from Florida through the West Indies and Mexico. The pubescence in specimens beaten from the same plant varies in hue from golden-yellow to gray, the holotype of var. *aurcopubescent* Knight (1926c, 102) being based upon a specimen in which it is of the former hue.

III. PYCNODERES Guerin, 1857, 168.

Small oval or oblong-oval species having the head, pronotum and scutellum punctate, shining; elytra opaque, almost smooth; head wider across eyes than apex of pronotum, front subvertical, vertex with a transverse impression, tylus prominent, decurved; beak reaching between middle coxæ; antennæ slender, about three-fourths the length of body, the length of joints varying as to species, 3 and 4 more slender than the basal ones; pronotum as in generic key, its basal half strongly gibbous, usually with a distinct median and shorter lateral impression; elytra with margin of embolium visibly curved; cuneus almost horizontal, its fracture scarcely evident. Seven of the nine⁸⁹ known North American species occur in the eastern states.

KEY TO EASTERN SPECIES OF PYCNODERES.

- a. Larger, length 3 or more mm.
- b. Second antennal subequal in length to width of head across eyes; legs pale yellow, the apical third of hind femora alone darker; veins of membrane not distinctly darker than the disk.

⁸⁹Van Duzee (1917, 360) has recorded *Pycnoderes incurvus* (Dist.), a Guatemalan and West Indian species, from the "S. St." The only mention of its occurrence in this country which I can find, and probably the one on which Van Duzee based his record, is that of Uhler in his "Hemiptera of Grenada" (1894a, 193), where he says, after his notes of its occurrence in Grenada: "In the southern United States it lives in midsummer on low herbs in open places on sandy beaches of streams." Distant's species is very close to, if not a synonym of, *P. quadrimaculatus* and Uhler, in making the above statement, probably confused the two.

- c. Embolium with a distinct apical or subapical pale spot; costal margin of elytra feebly curved; pronotum thickly pubescent; length, 3.2 mm. 953. *QUADRIMACULATUS*.
- cc. Embolium with subapical pale spot very small or wanting; costal margin of elytra strongly curved; pronotum with pubescence scarcely evident; length, 3.5—4 mm. 954. *DILATATUS*.
- bb. Second antennal distinctly longer than width of head across eyes; all the femora in part or wholly blackish-brown; veins of membrane dark brown or blackish.
- d. Joint 2 of antennæ wholly pale; tibiæ pale brown; length, 3—3.8 mm. 955. *CONVEXICOLLIS*.
- dd. Joint 2 of antennæ with apical half fuscous; tibiæ pale to yellowish; length, 4 mm. 956. *INFUSCATUS*.
- aa. Smaller, length less than 3 mm.; second antennal shorter than width of head across eyes.
- e. Pronotal disk evenly arched without median sulcus; embolium with pale spot only at apex. 957. *BALLI*.
- ee. Pronotal disk bilobed by a median sulcus; embolium with distinct pale spot only at base.
- f. Scutellum convex; mesoscutum not exposed; cell of membrane without a pale spot. 958. *MEDIUS*.
- ff. Scutellum much flatter; mesoscutum exposed; cell of membrane with a large clear spot on apical half near cuneus. 959. *DRAKEI*.

953 (1078). *PYCNODERES QUADRIMACULATUS* Guerin, 1857, 169.

Oblong-oval. Head dull yellow, vertex and front with three narrow black lines; pronotum and scutellum black, shining, rather thickly clothed with fine prostrate grayish hairs; clavus and corium black, the latter sometimes brown, both thinly covered with a bluish bloom; corium with an elongate subbasal spot and a smaller apical or subapical one pale yellow; cuneus and membrane pale translucent, the inner basal angles of both darker. Antennæ pale yellow, joint 1 slightly shorter than width of vertex, about one-half the length of 2; 3 and 4 fuscous. Pronotum shorter with hind portion more convex, its median groove deeper and longer than in *dilatatus*; basal margin emarginate at middle. Embolium narrower, and costal margin less rounded than in *dilatatus*. Length, 3—3.2 mm.

Phoenix, Ariz. (*Gerhard*). A neotropical species described from Cuba recorded from Biscayne Bay, Fla., and ranging southwest and south to Arizona, California, Mexico and the West Indies. Recorded by Van Duzee (1917) from New Hampshire and Massachusetts, but not included in Parshley's "Hemiptera of New England."

954 (1079). *PYCNODERES DILATATUS* Reuter, 1909, 3.

Larger and more broadly oval than *quadrимaculatus*. Color much the same, the apical pale spot of embolium very small or wanting; pubes-

cence of pronotum much less distinct, very fine or wanting; apical dark portion of hind femora longer and a deeper black. Pronotum longer, the gibbosity of hind lobe with sides more sloping and base more abruptly declivent; basal margin straight. Costal margin distinctly more rounded and less reflexed than in *dilatatus*; embolium wider, its upper surface transversely rugose. Length, 3.5–4 mm.

Washington, D. C., June 19—Nov. 2 (*Davis and Gerhard*).
Wilmington, N. Car., Aug. 16 (*Brinley*). Recorded only from
New Jersey, Maryland and District of Columbia.

955 (—). *PYCNODERES CONVEXICOLLIS* Blatchley, 1926, 166.

Male—Elongate-oval. Head in great part fuscous, cheeks and a stripe each side of vertex dull yellow; pronotum and scutellum shining black with a faint brassy tinge, very sparsely pubescent with fine prostrate hairs; elytra opaque with a bluish bloom covering most of the surface; cuneus, a large oblong spot near base of embolium and a smaller oval one near its apex, pale yellow; apical half of membrane dusky yellow, its veins and a spot at base dark brown; femora dark brown to blackish, paler at base, tibiae pale brown, yellowish toward tips, coxæ and tarsi yellowish, claws fuscous; under surface black, sterna coarsely punctate, ventrals shining, almost smooth, minutely pubescent. Joints 1 and 2 of antennæ pale yellow, 1 three-fourths as long as width of vertex, 2 nearly three times as long as 1, 3 and 4 dusky, subequal in length, each about as long as 2. Pronotum with sides and base subequal in length, calli larger and much more prominent, median groove of basal half deeper and lateral impressions better defined than in either of the preceding species; hind margin almost straight, feebly notched at middle. Embolium slightly narrower with margin less curved than in *dilatatus* and with only a trace of the transverse rugæ of that species; membrane surpassing abdomen by two-thirds its length. *Female*—Shorter and more broadly oval than male; color much the same. Gibbosity of pronotum higher, with median groove distinctly deeper, the sides and base more abruptly declivent and lateral impressions better defined. Elytra distinctly shorter; embolium slightly wider and more reflexed, its margin more strongly curved; membrane surpassing abdomen by less than one-third its length. Length, male, 3.5–3.8 mm.; female, 3–3.2 mm. (Fig. 185).



Fig. 185. Male X 9. (Original).

lowish, claws fuscous; under surface black, sterna coarsely punctate, ventrals shining, almost smooth, minutely pubescent. Joints 1 and 2 of antennæ pale yellow, 1 three-fourths as long as width of vertex, 2 nearly three times as long as 1, 3 and 4 dusky, subequal in length, each about as long as 2. Pronotum with sides and base subequal in length, calli larger and much more prominent, median groove of basal half deeper and lateral impressions better defined than in either of the preceding species; hind margin almost straight, feebly notched at middle. Embolium slightly narrower with margin less curved than in *dilatatus* and with only a trace of the transverse rugæ of that species; membrane surpassing abdomen by two-thirds its length. *Female*—Shorter and more broadly oval than male; color much the same. Gibbosity of pronotum higher, with median groove distinctly deeper, the sides and base more abruptly declivent and lateral impressions better defined. Elytra distinctly shorter; embolium slightly wider and more reflexed, its margin more strongly curved; membrane surpassing abdomen by less than one-third its length. Length, male, 3.5–3.8 mm.; female, 3–3.2 mm. (Fig. 185).

Marion, Putnam, Knox and Posey counties, Ind., April 26—Sept. 19; swept in numbers from low herbage in dense upland woods and in thickets along the banks of streams.

956 (—). *PYCNODERES INFUSCATUS* Knight, 1926c, 104.

Black; membrane fuscous-brown, veins and basal area paler; legs pale to yellowish, femora and front coxæ blackish, bases of femora pale. Joint 1 of antennæ pale, one-eighth shorter than width of vertex, 2 two and one-third times longer than 1. "Pronotum with disk more broadly gibbous than in *dilatatus*, the median line not so deeply impressed. Scutellum with apex more flattened and base more sharply convex." Length, 4 mm.

Known only from the Black Mountains, N. Car.

957 (—). *PYCNODERES BALLI* Knight, 1926c, 104.

Black; cuneus pale yellowish translucent, narrowly black on basal angle; membrane pale, veins and basal half of cell fuscous; legs pale, hind femora blackish on apical two-fifths, tarsi and apical third of tibiæ yellowish. Antennæ pale, joint 1 two-thirds as long as width of vertex, 2 nearly twice as long as 1. Embolium of nearly equal width throughout, its outer edge thickened. Length, 2.5 mm.

Known only from Sanford, Fla., where it was taken April 9—Aug. 30 by E. D. Ball. A var. *obscuratus* with antennæ and legs chiefly blackish was described by Knight (loc. cit.) from Philadelphia, Pa.

958 (—). *PYCNODERES MEDIUS* Knight, 1926c, 105.

Punctuation, pubescence and coloration nearly as in *dilatatus* Reut., apical pale spot on embolium nearly obsolete; membrane and veins distinctly fuscous; legs pale, front coxæ and apical half of femora fuscous to blackish. Antennæ pale, joint 4 fuscous. Length, 2.8—2.9 mm.

Described from Hollister, Mo.; Clarksville, Tenn., and Leland, Miss. "Allied to *dilatatus*, but differs in the smaller size, fuscous membrane and broader, more heavily gibbous bilobed pronotal disk." (*Knight*).

959 (—). *PYCNODERES DRAKEI* Knight, 1926c, 106.

Closely allied to *medius*. Head yellowish-brown, vertex, median line on front and convex portion of tylus, blackish; embolium with large pale spot on basal half; membrane uniformly dark fuscous, with clear spot as in key. Embolium broader than in *medius*, its edge sharp. Length, 2.9 mm.

Described from a single female taken June 26 at Aberdeen, Miss.

IV. *SIXENOTUS* Reuter, 1876, 77.

Short, oval, shining species having the head wider across eyes than apex of pronotum, front subvertical, vertex wide, with an oblong median impression; beak reaching middle coxæ;

antennæ pilose, three-fourths the length of body, joint 1 stoutest, usually not reaching tip of tylus, 2 feebly thickened toward apex, 3 and 4 more slender; pronotum with base more than twice as wide as apex, sides feebly sinuate, calli very small, disk behind them strongly convex, coarsely and densely punctate, hind margin with sides rounded, middle sinuate; scutellum small, partly concealed by pronotum, punctate at base, smoother toward apex; elytra entire, impunctate, somewhat scabrous, costal margin feebly broadly curved, cuneus declivent. Six species are known from the eastern states.

KEY TO EASTERN SPECIES OF SIXENOTUS.

- a. Femora not wholly black; elytra usually finely and indistinctly pubescent.
- b. Cuneus white, embolium pale yellow; basal joint of antennæ slightly longer than width of vertex; length, 2.4—2.6 mm. 960. GRACILIS.
- bb. Cuneus and embolium black; basal joint of antennæ distinctly shorter than width of vertex.
- c. Antennæ and legs wholly milky-white, tarsal claws alone darker. 961. ALBICORNIS.
- cc. Antennæ in part black or fuscous, sometimes wholly so.
- d. Membrane not abbreviated; legs dull yellow, more or less tinged with fuscous, middle and hind tibiæ with two vague brownish rings. 962. INSIGNIS.
- dd. Membrane abbreviated, extending beyond cuneus only for a space equal to its length; legs wholly pale yellow. 963. BREVIS.
- aa. Femora wholly black, trochanters and tarsi pale; elytra coarsely, distinctly pubescent.
- e. Basal half or more of scutellum concealed; pubescence brownish. 964. TENEBROSUS.
- ee. Scutellum wholly exposed; pubescence whitish. 965. ALBOHIRTUS.

960 (—). *SIXENOTUS GRACILIS* Blatchley, 1926, 168.

Oblong-oval. Head, pronotum, scutellum and under surface black, distinctly bronzed; joints 1 and 2 of antennæ, embolium and legs yellow; cuneus, membrane and dilated apex of embolium white; veins of membrane and joints 3 and 4 of antennæ fuscous-brown. Eyes larger and vertex narrower than in the other species. Joint 1 of antennæ relatively stout, cylindrical, three-fifths the length of 2; 3 and 4 more slender, subequal, each slightly longer than 2. Pronotum with basal lobe narrower, more convex, more finely and densely punctate than in the others, the basal margin broadly rounded or subtruncate. Elytra and ventrals sparsely clothed with minute golden yellow hairs. Length, 2.4—2.6 mm.

Ft. Myers and Hillsboro Canal, Fla., March 4—24. The type was sifted from the debris on the mucky bottom of an extinct

wet weather pond at Ft. Myers. Easily known by its small size and pale embolium and cuneus.

961 (—). *SIXENOTUS ALBICORNIS* Blatchley, 1926, 167.

Closely allied to *insignis*. Form more elongate, sides more subparallel. Head, pronotum and scutellum shining black, devoid of the faint subaneous tinge of *insignis*; elytra piceous-brown, opaque, subtranslucent; membrane with apical half nearly white, cells dark fuscous, veins almost black; under surface shining black; antennæ and legs wholly milky white or a very pale yellow. Joint 1 of antennæ reaching apical fourth of tylus, 2 twice as long as 1, 3 two-thirds as long as 2, 4 nearly twice the length of 3. Pronotum longer and more narrowed in front than in *insignis*, its disk more distinctly obliquely strigose with rows of punctures between the strigæ, the punctures coarser and less dense than in *insignis*. Length, 3.3—3.5 mm.

Palmdale, Moore Haven, R. P. Park and Dunedin, Fla., Nov. 19—April 23 (*H. S. B.*). Everglade, Fla., April 11 (*Davis*). Mobile, Ala., Sept. 8 (*Gerhard*). Frequent about Dunedin, hibernating beneath boards and between basal leaves of sedges, and in spring swept from herbage along the margins of wet hammocks. Taken also at porch light and on flowers of holly.

962 (1074). *SIXENOTUS INSIGNIS* Reuter, 1876, 78.

Oblong-oval. Head, pronotum, scutellum and under surface shining black with a tinge of bronze; elytra black, opaque, minutely and very sparsely pubescent; membrane with apical half pale, cells and veins fuscous; legs as in key, tips of tarsi fuscous; antennæ pale yellow, extreme base of joint 1 and the outer joints dusky. Clavus and cuneus finely scabrous; corium smooth, feebly translucent toward apex. Length, 3.3—3.5 mm.

Plummer's Island, Md., Aug. 29 (*Gerhard*). Texas (*Davis*). Recorded from seven stations in Florida by Barber, but these records probably refer, at least in part, to *albicornis*. Ranges from New England and New York southwest in the coastwise states to Texas. Recorded also from Colorado and Arizona. It occurs in the north on skunk cabbage, *Spathyema fatida* (L.).

963 (—). *SIXENOTUS BREVIS* Knight, 1926c, 107.

Black; clothed with erect pale yellowish pubescence; membrane pale fuscous, veins black. Antennæ black, finely pale pubescent, joint 1 less than half as long as width of vertex, 2 twice the length of 1. Pronotum with front half strongly flattened, sides sinuate. Length, 2.3 mm.

Known only from Hattiesburg, Miss. "Distinguished from *tenebrosus* by the flatter and more elongate pronotum, broadly exposed scutellum, abbreviated membrane and pale yellowish legs." (*Knight*).

964 (1075). *SIXENOTUS TENEBROSUS* (Distant), 1893, 441.

Oblong-oval, male, more broadly oval, female. Head, pronotum, scutellum and under surface black, strongly shining, with a faint bronze lustre; elytra brownish-black, subopaque, rather thickly clothed with conspicuous subprostrate yellowish hairs; membrane pale to fuscous-brown, the cells and veins darker; legs fuscous-brown to black, the coxæ, tarsi and sometimes the tibiæ dull yellow. Joints 1 and 2 of antennæ dark brown to black, 1 scarcely one-half as long as width of vertex, 2 twice as long as 1, 3 and 4 fuscous-brown, each slightly longer than 2. Length, 2.8—3 mm.

Dunedin, Fla., Oct. 25—April 6. Swept from herbage about the margin of ponds (*W. S. B.*). Rock Creek, D. C., June 26 (*Gerhard*). Described from Guatemala. Recorded in this country from Clearwater, Bellaire and La Belle, Fla., Maryland and Kansas.

965 (—). *SIXENOTUS ALBOHIRTUS* Knight, 1926c, 107.

More elongate than *tenebrosus*. Black, thinly clothed with prominent suberect white pubescent hairs; membrane dark fuscous, slightly paler at middle, veins black, finely pubescent; legs as in *aa.* of key. Joints 1 and 2 of antennæ dark brown to black, 1 one-half as long as width of vertex, 2 almost twice the length of 1, 3 two-thirds as long as 2. Pronotum more elongate and not so wide as in *tenebrosus*. Length, 2.6—2.8 mm.

Dunedin, Fla., Oct. 26; swept from a low huckleberry. Described from Sanford, Fla., and not recorded elsewhere.

V. *MONALOCORIS* Dahlbom, 1850, 209.

Small oval brownish species having the head wider across eyes than long; beak reaching hind coxæ; antennæ about two-thirds as long as body, the outer joints more slender than the basal ones; pronotum short, trapezoidal, one and a half times as broad at base as long; disk convex, with calli and collar distinct; elytra entire, passing tip of abdomen, clavus deflected to corium, cuneus short, triangular, feebly deflexed, the outer edge incurved so as to appear notched at base; hind tarsi with joint 3 longest, 1 and 2 subequal. One widely distributed species is known.

966 (1082). *MONALOCORIS FILICIS* (Linnæus), 1758, 443.

Oblong-oval, male, more broadly oval, female. Pale brownish-yellow to dark brown, sparsely clothed with fine prostrate yellow hairs; clavus usually somewhat darker than corium; membrane pale translucent with a faint dusky tinge, the veins and cells slightly darker; legs and beak yellow. Joints 1 and 2 of antennæ yellow, the tip of 2 piceous; 1 about three-fourths as long as width of vertex, 2 feebly thickened toward tip, two and a half times longer than 1; 3 and 4 filiform, piceous, the base

of 3 paler, united one-third longer than 2. Head smooth, polished. Pronotum finely, rather sparsely, somewhat unevenly punctate; scutellum and clavus finely transversely wrinkled. Length, 2.3—2.7 mm.

Porter and Marion counties, Ind., Aug. 22—Sept. 12. Istokpoga, R. P. Park, Ft. Myers and Dunedin, Fla., Nov. 17—April 14 (*W. S. B.*). Hessville and Mineral Springs, Ind., July 24—Sept. 4 (*Gerhard*). Scarce in Indiana. Frequent at R. P. Park and Dunedin, Fla., on *Pteridium aquilinum* (L.) and other ferns in and about the margins of moist dense hammocks. A European species ranging in this country from Quebec and New England west to Wisconsin and British Columbia and south to Florida, Texas and Mexico. As the specific name indicates, it occurs mainly on ferns, though often swept from other vegetation about the margins of ponds, and in Florida hibernating beneath boards and piles of weed debris in moist places. The color varies to some extent, northern specimens being darker brown than those from the south, with the basal angles of pronotum pale.

VI. SYSINAS Distant, 1883, 248.

Elongate-oblong, shining species having the head broad at base, narrowed in front, inserted in thorax to eyes, vertex declivent behind; beak but slightly surpassing front coxæ; joint 1 of antennæ reaching or slightly passing tip of tylus, 2 subequal in length to width of head, 3 and 4 more slender; pronotum subcampanulate, base about three-fourths wider than apex, sides sinuate near middle, calli prominent, convex, oblique, basal lobe convex, finely and densely punctate, its hind margin broadly rounded; scutellum flat, rugose, its base with a median triangular impression; elytra entire, slightly surpassing abdomen, sides parallel. One species has been recorded from the eastern states.

967 (1083). SYSINAS LINEARIS Distant, 1883, 248.

Elongate-oval. Head yellow, base of tylus and median stripe on vertex piceous; pronotum with collar and hind lobe orange-red, calli yellow, percurrent median line blackish; scutellum and elytra dull black; membrane fuscous-brown, its tip paler; coxæ and femora yellow, the apical halves of latter blackish above; tibiæ and tarsi fuscous-brown. Antennæ with joint 1 black; 2 piceous, paler at base; 3 and 4 fuscous. Eyes prominent, sessile, projected their full length beyond sides of collar of pronotum. Scutellum and elytra, except membrane, finely and densely rugose-punctate, each puncture bearing a minute grayish-yellow appressed hair; costal margin narrowly reflexed. Length, 5.5—6 mm.

Sea Cliff, N. Y. (*Banks*). Perhaps adventive, as it was described from Mexico and is not recorded elsewhere.

Subfamily V. CLIVINEMINÆ Reuter, 1876, 62.

Elongate-oval species having the head, pronotum and scutellum thickly clothed with matted pubescence; loræ very narrow; pronotum trapezoidal, its apical half without a collar, but hood-like as described in subfamily key, p. 663, its sides, in our species, carinate their full length; elytra entire, membrane two-celled, the smaller cell narrow; legs short, stout, tibiæ beset with numerous close-set hairs, without spines or setæ, arolia wanting. The subfamily is represented in North America by but two genera, one in the eastern states.

I. LARGIDEA Van Duzee, 1912a, 480.

Head short, nearly vertical; vertex without a basal carina; beak slightly passing middle coxæ; pronotum coarsely and densely punctured, one-half wider at base than long, base nearly twice as wide as apex, its margin broadly rounded above base of scutellum; elytra finely, shallowly punctate; basal joint of tarsi nearly as long as the others united, widened and flattened beneath (pl. X, fig. 27). Five species are known, four occurring in the western states, the other in our territory.

968 (1089¾). LARGIDEA DAVISI Knight, 1917b, 7.

Elongate-oval. Color a nearly uniform dark red, thickly clothed with fine prostrate gray hairs; head and transverse groove of pronotum blackish; membrane pale dusky brown, the veins darker; sterna and sides of abdomen tinged with blackish. Antennæ with joints 1 and 2 robust, 1 darker and stouter than the others, only about two-fifths as long as width of vertex; 2 as long as width of head across eyes, almost linear, male, strongly thickened toward apex, female; 3 and 4 very short, subequal in length, each slightly longer than 1, 4 much thinner than the others. Calli outlined or bordered in front and behind by impressed lines which merge and extend downward on sides to the coxal cleft. Length, 6—6.3 mm.

Promised Land, Long Island, N. Y., Sept. 24 (*Davis*). Recorded only from that, the type station, and from Hyannis Port, Mass. Occurs on pine.

Subfamily VI. CYLAPINÆ Poppius, 1909, 1.

This subfamily, as characterized in the key, p. 663, comprises species of variable form and size in which the pronotum is constricted to form a distinct apical collar or with a flattened

anterior margin resembling a collar; legs long and very slender, arolia wanting. Representatives of four genera of the subfamily have been recorded from the eastern states.

KEY TO GENERA OF SUBFAMILY CYLAPINÆ.

- a. Membrane not pilose above and beneath.
 - b. Antennæ long and slender, much longer than body; head short, vertical; vertex with a deep longitudinal impression; sides of pronotum not margined. I. CYLAPUS, p. 877.
 - bb. Antennæ not longer than the body; head declivent; vertex without a median impression; sides of pronotum margined, at least on basal half.
 - c. Form elongate; costal margins subparallel; sides of pronotum concavely arcuate; tarsi, as in other Mirids, 3-jointed. II. FULVIUS, p. 878.
 - cc. Form broadly oval; costal margins strongly curved; sides of pronotum not concavely arcuate; tarsi abnormal, only 2-jointed. III. PERITROPIS, p. 880.
- aa. Membrane very finely pilose both above and beneath; form oblong-oval; entire upper surface of body pilose. IV. BOTHYNOTUS, p. 881.

I. CYLAPUS Say, 1832, 26; I, 347.

In addition to characters above given, this genus has the eyes very large, protuberant, oblique; antennæ inserted above the base of tylus by a distance equal to length of tylus, their basal joint thickened, fusiform, the others filiform; pronotum with collar very narrow, calli short, not reaching the middle of disk; basal joint of tarsi as long as the others united. One species occurs in our territory.

969 (1090). CYLAPUS TENUICORNIS Say, 1832, 26; I, 347.

Elongate-oval. Dark brown, subopaque; lower front of head, a spot behind apical angles and median carina on basal half of pronotum, a spot each side of base and tip of scutellum, an oblique submarginal ray near middle of corium, apex of embolium and narrow inner margin of cuneus, pale yellow; membrane dusky translucent, a bar across middle and apex of cells paler, base of cells and veins darker; legs pale brown, apical half of tibiæ with one, of femora with two pale rings; gula, prosternum and osteolar duct pale yellow; remainder of under surface dark chestnut brown, shining, the ventrals thinly clothed with yellowish hairs. Joint 1 of antennæ dark brown, paler at base, visibly curved, as long as width of head across eyes; 2 very slender, pale brown, extreme tip yellow, three times as long as 1; 3 and 4 more slender, pale to dark brown, 3 slightly longer than 2, 4 one-half the length of 3. Pronotum with calli prominent, minutely punctate, separated by a narrow deep groove; disk behind them short, wide, subdepressed, densely punctate and with a low median carina. Scutellum, clavus and corium finely and densely punctate. Length, 6—7 mm.

Richmond, N. Y., Aug. 4 (*Davis*). Described from Posey Co., Ind. The known range is from Ontario and New England west to Indiana and south to Maryland. Occurs on fungus covered logs and dead trees. Very rapid in its movements, difficult to capture and scarce in collections.

II. FULVIUS Stal, 1862, 322.

Elongate or oblong, rather slender brownish species, having the head porrect, subconical, longer than wide, its front prolonged in front of eyes, horizontal or feebly declivent; beak reaching or surpassing third ventral; pronotum sub-trapezoidal slightly narrower at base than long, calli large, reaching middle of disk, separated by a short longitudinal groove, hind angles prominent, prolonged backward, basal margin concave, not covering mesoscutum; elytra usually entire and slightly passing tip of abdomen, cuneus horizontal; tibiæ and tarsi very slender, the former without spines, the latter with basal joint but little shorter than the others united. Three species have been recorded from the eastern states. They occur usually on fungous-covered dead trees or logs.

KEY TO EASTERN SPECIES OF FULVIUS.

- a*: Second antennal in part or wholly pale.
 - b*. Second antennal wholly pale yellowish; scutellum with a spot each side of middle and apex pale. 970. BRUNNEUS.
 - bb*. Second antennal with apical third or less pale; scutellum fuscous-black or brown. 971. IMBECILIS.
 - aa*. Second antennal wholly black. 972. ATRATUS.
- 970 (1091). FULVIUS BRUNNEUS (Provancher), 1872, 104.

Oblong-oval. Head, pronotum, apical third of elytra, femora and under surface dark chestnut-brown; basal two-thirds of elytra, beak, tibiæ and tarsi dull yellow; basal half or outer basal angle of cuneus pale yellow. Joint 1 of antennæ one-half longer than width of head across eyes, dark brown, its extreme apex pale, tinged with reddish; 2 more than twice as long as 1, dull yellow; 3 and 4 fuscous-brown, united subequal in length to 2. Pronotum about one-fourth narrower at base than long, calli less prominent with impression between them more shallow than in *imbecilis*, basal angles more prolonged backward than there. Elytra slightly surpassing abdomen, male; a little shorter than abdomen with cuneus and membrane very small and tips broadly rounded, female. Length, 3.2—3.4 mm.

Marion Co., Ind., July 18 (*W. S. B.*). Willow Springs and Pullman, Ill., July 13—Oct. 27 (*Gerhard*). Ranges from Quebec

and New England west to the Pacific; not recorded in the east south of Maryland. Uhler, after the original description of his *Pamrocoris anthocoroides* (1877, 425), a synonym of *F. brunneus*, says: "This is the most interesting Heteropter which has as yet been found in North America. While being an undoubted Phytocorid (Mirid) in its details of higher group value it yet presents the features and some of the characters of both the Lygæidæ and Anthocoridæ." He later states (1894, 247) that it occurs in the West Indies, Central America and Mexico.

971 (1092). *FULVIUS IMBECILIS* (Say), 1832, 25; I, 345.

Elongate, sides subparallel. Head, pronotum and scutellum dark brown; elytra paler brown, a premedian oblique yellowish spot across corium and a pale yellow calloused spot on basal half of cuneus; membrane pale brownish-translucent, feebly iridescent; legs and under surface in great part pale brownish; coxæ, knees, middle of beak, tarsi, tips of tibiæ and base of ventrals, dull yellow. Joint 1 of antennæ reddish-brown, as long as head; 2 with basal two-thirds or more dark brown, remainder pale yellow; 3 and 4 fuscous-brown. Pronotum much as in *brunneus*, the calli more prominent, impression between them deeper, hind angles less prolonged, basal margin more shallowly concave. Elytra slightly surpassing abdomen, male, reaching its tip, female. Length, 4—4.5 mm.

Marion, Vigo, Knox and Lawrence counties, Ind., Aug. 6—Oct. 16 (*W. S. B.*). Raleigh, N. Car., Sept. 11 (*Brimley*). Taken from dry fungi about the base of stumps; also in late autumn from beneath logs and other cover in moist woodland. Described from Indiana. The known range extends from New Jersey west to Michigan and Indiana and southwest to North Carolina. Easily known from *brunneus* by the longer first antennal, wholly dark scutellum and paler femora. The pale spot on cuneus is often in part margined with red.

972 (1093). *FULVIUS ATRATUS* Distant, 1884, 282.

Elongate-oval. Black; basal third of corium with a transverse whitish bar, terminating inwardly at middle of outer claval margin; cuneus pale brownish-yellow, its tip and inner basal angle black; membrane blackish, its apical half pale fuscous; femora brownish-yellow, their bases piceous; tibiæ pale fuscous, tarsi dull yellow. Joint 1 of antennæ dull brownish-yellow, its base piceous; 2 black, 3 and 4 fuscous. Length, 4 mm.

A neotropical species, described from Guatemala and taken at Biscayne Bay, Fla., by Mrs. Slosson, that being the only definite station record for this country.

III. PERITROPIS Uhler, 1891, 121.

Oval or subelliptical species having the head porrect, narrowed and conical in front of eyes, vertex convex with an impressed line on middle, tylus prominent, its base on a line with that of antennæ; beak reaching or surpassing fourth ventral; antennæ half the length of body, joint 1 stoutest, subequal in length to width of vertex, 2 about as long as head and pronotum united, 3 and 4 short and slender, united about three-fifths the length of 2; pronotum twice as wide at base as long, almost flat, feebly declivent from the base forward, calli rounded, convex, placed near middle of disk; scutellum large, equilateral; mesoscutum convex, widely exposed; elytra entire, thick, opaque, cuneus small, its fracture feeble, embolium broad, flattened, membrane large, uniformly fuscous; legs short, femora stout, compressed, subfusiform; tibiæ very slender.

As pointed out by McAtee & Malloch (1924, 71) *Peritropis* is an aberrant genus in that the tarsi are 2-jointed instead of 3-jointed as in other Mirids. They regard it, therefore, as an "annectant" or connecting link between the families Miridæ and Isometopidæ. The absence of ocelli and the two closed cells of membrane denote, however, that it is a true Mirid. Two of the three known species occur in the eastern states.

KEY TO EASTERN SPECIES OF PERITROPIS.

- a. Hind margin of pronotum sinuate and with three small white tubercles; corium fuscous with faint pale dots along the costal margin. 973. *SALDÆFORMIS*.
 - aa. Hind margin of pronotum almost straight, without tubercles; corium blackish-brown flecked with numerous gray dots. 974. *HUSSEYI*.
- 973 (1094). *PERITROPIS SALDÆFORMIS* Uhler, 1891, 122.

Broadly ovate. Dark brown or blackish-fuscous, very sparsely pubescent; head brownish-yellow, sides and vertex marked with fuscous; joints 1 and 2 of antennæ blackish-brown, 2 paler at base, 3 and 4 pale brown; pronotum brownish-yellow, an angular spot each side of calli and a smaller one between them, blackish; side margins with small black dots, hind one with three small white tubercles; elytra blackish-brown, embolium dull brownish-yellow, costal margin with small white dots, cuneus with base and inner margin pale; membrane pale fuscous; legs blackish, base and tips of femora pale; tibiæ with two testaceous rings. Structural characters as under genus heading. Length, 2.7—3 mm.

Recorded from Maryland, District of Columbia, northern Illinois and Texas. Occurs on dead branches of trees.

974 (—). *PERITROPIS HUSSEYI* Knight, 1923c, 50.

Rather broadly oval. Fuscous-brown or blackish thickly mottled above with small pale dots, these in places confluent to form small pale spots; scutellum black, the apical fourth and a few scattered dots pale; cuneus black with a few pale dots near base; membrane fuscous, the veins slightly darker; under surface and legs brownish-black, the former sparsely clothed with yellowish hairs, middle and hind tibiæ paler toward tips; joints 1 and 2 of antennæ dark brown to black, 2 with a small submedian pale spot above, 3 and 4 slender, black. Beak reaching middle of sixth ventral. Pronotum with sides straight and converging from base to apex, their margins feebly reflexed; calli small, rounded, separated by a shallow median groove; hind margin broadly concave. Mesoscutum widely exposed, elevated above base of scutellum. Elytra conjointly oval, costal margins broadly curved, narrowly reflexed on basal half, disk with pale dots each bearing a very minute yellowish hair, these visible only when viewed from the side. Length, 3—3.2 mm.

Marion Co., Ind., July 30; one example taken from a pile of cord-wood in dense woodland. Recorded only from near Ann Arbor, Mich., and Tuskegee, Ala. The Indiana specimen has three minute white calloused spots, not tubercles, on the hind margin of pronotum. The Michigan types were taken by Hussey from beneath loose bark of white oak logs. This *Mirid* is distinct from all others at hand by the combination of conical head, flat, regularly trapezoidal pronotum, long beak and very numerous pale dots on a dark background.

IV. *BOTHYNOTUS* Fieber, 1864, 76.

Oblong-oval pubescent species having the head wider across eyes than long, strongly constricted just behind eyes into a short neck, its front vertical, strongly flattened; tylus convex, its base separated from the front; eyes prominent, not contiguous with pronotum; joints 1 and 2 of antennæ stout, of equal thickness, densely pilose, 3 and 4 abruptly much more slender, also pilose; beak reaching middle coxæ; pronotum trapezoidal, declivent forward, disk hairy, twice as wide at base as long, deeply, closely punctate; calli smooth, confluent at middle, forming a smooth, shining arc; mesoscutum concealed; scutellum triangular, minutely transversely wrinkled, deeply impressed at base, a median carina on apical half; elytra sometimes dimorphic, in male, surpassing abdomen, rugose, hairy, cuneus and membrane much deflected; in female sometimes reaching only to fourth dorsal, the membrane absent; legs pilose, hind femora slender, not reaching tip of abdomen; joint 1 of tarsi longest, 2 shortest, claws toothed at base, without arolia. One species is known from our territory.

975 (976½). *BOTHYNOTUS MODESTUS* (Wirtner), 1917, 34.

Male—Oblong. Fuscous-brown, thickly clothed with short inclined blackish hairs; head, neck and collar dull red; tylus, calli and scutellum piceous; membrane dusky, iridescent, a whitish spot beneath tip of cuneus; legs brownish-yellow; ventrals reddish-brown, their side margins blackish. Joint 1 of antennæ rufous, swollen, slightly longer than width of vertex; 2 cylindrical, rufous at base, piceous toward apex, four-fifths as long as basal width of pronotum; 3 yellowish, 4 dusky, the two united one-fifth shorter than 2. Elytra minutely punctate; membrane longer than basal width of pronotum, rugose, very finely pubescent, both above and below, apex of large cell broadly rounded. *Female*—Oval. Above and beneath black or piceous, strongly shining; legs black or piceous, tibiæ sometimes dull yellow. Joints 1 and 2 of antennæ black or piceous-black; 1 as long as width of vertex, 2 distinctly thickened toward apex, one-fourth shorter than in male. Membrane, brachypterous form, three-fourths as long as basal width of pronotum, slightly passing tip of abdomen. Length, male, 4—5 mm.; brachypterous female, 3.8—4.2 mm.

Dunedin, Fla., Feb. 23—April 16; two females beaten from dense bunches of Spanish moss (*H. S. B.*). Greensburg, Pa., Aug. 16—Sept. 18 (*Wirtner*). Described from there and recorded elsewhere only from Illinois. When compared with specimens of the European *B. pilosus* (Boh.), received from W. E. China, I found the latter to have joints 1 and 2 of antennæ more sparsely and finely pilose and distinctly shorter, 1 being only three-fifths as long as width of vertex, 2 cylindrical in both sexes, about three-fifths as long as basal width of pronotum, 3 and 4 united as long as 2; female with elytra reaching fourth dorsal, membrane absent; legs, except tarsi, reddish-yellow in both sexes. The two species are, in my opinion, very distinct.

Subfamily VII. *DERÆOCORINÆ* Van Duzee, 1915, 114.

Oval or oblong-oval, robust, shining Mirids of medium size having the head small, as wide or wider across eyes than apex of pronotum, its front usually vertical or nearly so; eyes large, prominent; antennæ generally shorter than body, the third and fourth joints usually more slender than the basal ones; pronotum trapezoidal and with a distinct but narrow collar; scutellum large, flat, equilateral; elytra entire, coriaceous, subdepressed, usually surpassing the abdomen, cuneus horizontal or feebly deflexed, its fracture weak; membrane 2-celled; claws usually cleft at base, arolia very slender, bristle-like, pseud-arolia absent.

The subfamily is represented in the eastern states by five of the seven known North American genera.

KEY TO EASTERN GENERA OF SUBFAMILY DERÆOCORINÆ.

- a.* Vertex transversely striate and with a longitudinal sulcus; joint 2 of hind tarsi much shorter than either 1 or 3.
- b.* Antennæ linear, of nearly equal thickness throughout, joint 2 scarcely enlarged at apex, 3 and 4 linear. I. EUSTICTUS, p. 883.
- bb.* Joint 2 of antennæ clavate, 3 and 4 short and thick, fusiform. II. DIPLOZONA, p. 887.
- aa.* Vertex more or less polished, scarcely striate or sulcate; joints 1 and 2 of hind tarsi subequal.
- c.* Head strongly produced and nearly horizontal, surpassing apex of first antennal; second antennal thick, nearly linear, longer than the other three united; upper surface covered with stiff erect hairs; embolium thin, broadly expanded, sides nearly parallel. III. EURYCHLOPTERELLA, p. 887.
- cc.* Head less produced, scarcely surpassing middle of first antennal; upper surface either pubescent or subglabrous; embolium not as above.
- d.* Pronotum distinctly margined; first antennal surpassing tip of tylus by less than half its length; hind margin of eyes nearly in contact with pronotal collar; scutellum punctate. IV. CAMPTOBROCHIS, p. 888.
- dd.* Pronotum not margined; first antennal surpassing tip of tylus by more than half its length; eyes sloping forward away from collar; scutellum impunctate (except in *D. ruber* Linn.). V. DERÆOCORIS, p. 892.

I. EUSTICTUS Reuter, 1909, 35.

Elongate- or oblong-oval, shining, subglabrous species having the head one-half the width of base of pronotum, its front vertical, transversely strigose, vertex without basal carina; eyes of male usually much larger than those of female; beak reaching first ventral; antennæ as in *b* of key; pronotum one-half or more wider at base than apex, sides straight, basal half convex, declivent forward, shallowly and sparsely punctate, hind margin broadly rounded, calli large, rather low, oblique, occupying most of the apical two-fifths of disk; elytra entire, reaching tip of abdomen, cuneus feebly reflexed, as wide or wider at base than long; legs long, hind femora slender, reaching tip of abdomen, female, slightly surpassing tip, male. Other characters as in key. Six species have been recorded from the eastern states. They have in the past been mostly recorded under the generic names *Megacælum* Fieb. and *Cimatlan* Dist.

KEY TO EASTERN SPECIES OF EUSTICTUS.

- a. Hind tibiæ with long pilose hairs or setæ on basal half, these distinctly longer than true spines.
- b. Pronotal disk uniform brownish-black; legs chiefly reddish-brown; tibiæ not banded with paler; length, 8—10 mm. 976. GROSSUS.
- bb. Pronotal disk with front half blackish, hind one paler; legs pale brownish-yellow with black markings; tibiæ with four alternating pale and fuscous bands. 977. VENATORIOUS.
- aa. Hind tibiæ with only short and fine pubescence.
- c. Pronotum chiefly black, lateral margins not pale; width of vertex in male twice or more the thickness of first antennal.
- d. Coria with a piceous band across the tips; scutellum wholly black; legs uniform reddish-brown. 978. MUNDUS.
- dd. Coria without a piceous band across the tips; scutellum black with spot on basal angles and median stripe on apical half pale; legs more or less spotted with pale. 979. NECOPINUS.
- cc. Pronotum with median portion black, sides broadly pale; width of vertex in male usually but little more than thickness of first antennal.
- d. Smaller, length, 5.5—6 mm.; joint 4 of antennæ shorter than joint 1. 980. CATULUS.
- dd. Larger, length, 7—7.5 mm.; fourth joint of antennæ as long as or longer than joint 1. 981. SALICICOLA.

976 (1054). *EUSTICTUS GROSSUS*^{89a} (Uhler), 1887b, 70.

Head, elytra, antennæ and legs pale reddish- or yellowish-brown; pronotum and scutellum blackish-brown; inner apical angles of corium and cuneus piceous, outer one of corium tinged with reddish; membrane dusky translucent, cells and veins darker; under surface pale brownish-yellow, genital region darker; tibiæ and basal joints of beak usually in part reddish, tarsi dull yellow. Joint 1 of antennæ stout, narrowed at base, about as long as pronotum, beset with numerous long black setæ, similar to those on legs; 2 more slender, cylindrical, two and a half times as long as 1; 3 dull yellow, darker at base, two-fifths the length of 2; 4 fuscous, its tip paler, three-fourths as long as 3. Pronotum one-third wider at base than long, sides feebly sinuate, their pale edges narrowly reflexed; calli larger, united at middle, disk behind them transversely rugose, finely scabrous, indistinctly punctate. Elytra with a row of punctures each side of radial veins, otherwise smooth. Femora and tibiæ all with numerous long erect blackish hairs. Length, 8—10 mm.

Posey Co., Ind., Sept. 21. Miami, R. P. Park, Lake Okeechobee and Dunedin, Fla., Dec. 4—March 20. Beaten from foliage of shrubs along the margins of hammocks. Previously recorded from Crescent City and Biscayne Bay, Fla. Ranges from New England and New York west to southern Indiana and southwest to Florida and Texas. Uhler mentions it as "moderately common on pine bushes in Maryland and Massachusetts in July."

^{89a}China (Ms.) states that, in his opinion, *E. grossus* is the same as *Capsus flicicornis* Walker (1873, 96), which Van Duzee, following Distant, lists as a *Creon-tides*. If so Walker's name has priority.

977 (1050). *EUSTICTUS VENATORIUS* Van Duzee, 1912a, 479.

Dull brownish-yellow, the upper surface, head, femora and middle and hind tibiæ sparsely clothed with long, suberect brownish hairs; vertex, apical two-thirds of pronotum, scutellum in part, inner apical angle of corium and tips of embolium and cuneus, fuscous-black or brown; basal third of pronotum, clavus and apical halves of femora more or less flecked with fuscous; a spot each side of base and tip of scutellum and the greater part of cuneus pale yellow; membrane fuscous, its veins and cells darker; under surface dull yellow, the genital region darker. Joint 1 of antennæ dark brown, as long as head; 2 yellow, or brown, thickly dotted with fuscous or yellow, more than twice the length of 1; 3 pale yellow, its base with fuscous dots, subequal in length to 1; 4 dark brown, two-thirds as long as 3. Eyes of male very large, narrowly separated above. Pronotum rather finely, irregularly and shallowly punctate. Length, 6.5—8.2 mm.

Cape Sable, Fla., Feb. 23; beaten from foliage along a path-way of a dense hammock. (*W. S. B.*). Lakeland, Fla., May 6 (*Davis*). Recorded also from Key West and Crescent City, Fla. Known elsewhere only from New York. Van Duzee's types, from Hamburg and Gowanda, N. Y., "were beaten from hickory trees over which they were prowling, apparently in search of prey."

978 (1052). *EUSTICTUS MUNDUS* (Uhler), 1887b, 71.

Head, elytra and under surface pale brownish-yellow, in part often heavily tinged with red; eyes, pronotum and scutellum black; embolium pale translucent yellow, its apex red and black; inner basal angles and margins of cuneus and a narrow curved bar across apex of corium piceous; membrane dusky translucent, its veins darker; beak and legs pale yellow, more or less tinged with red; genital segments darker. Eyes of male very large, not contiguous to pronotum. Antennæ with joints of same relative length as in *grossus*, 1—3 dull red, faintly dotted with fuscous, 4 brown, its tip red. Pronotum thickly, rugosely, rather coarsely and shallowly punctate, its collar and very narrow margins reddish-yellow. Scutellum minutely transversely strigose, the disk with a large shallow median impression. Outer margin of clavus and inner one of corium each with two regular rows of fine punctures, elytra otherwise almost smooth. Length, 5.3—6 mm.

Dunedin and Kissimmee, Fla., March 21—June 11; swept from flowers of the coast germander, *Teucrium littorale* Bick., and taken at porch light. Recorded only from Enterprise and Crescent City, Fla., and eastern Georgia.

979 (—). *EUSTICTUS NECOPINUS* Knight, 1923, 481.

Pronotum brownish-black, disk with collar, narrow margins and a few small scattered spots, paler, sometimes, var. *discretus* Knight, wholly

dark; color of scutellum as in key; elytra pale translucent, irregularly marked with dark fuscous; cuneus yellowish sub-hyaline, apical half and inner basal angle blackish; membrane pale, veins and side margins in part brownish to fuscous; legs brownish-black, femora paler at base and spotted apically, tibiæ with pale spots; ventrals dull yellow spotted with reddish. Joint 1 of antennæ pale with black markings, three-fourths as long as width of head across eyes; 2 brownish-black almost three times as long as 1; 3 and 4 black, 3 one-half as long as 2, 4 four-fifths the length of 3. Length, 5.6—7 mm.

Recorded only from Ontario and New York, the var. *discretus* from Connecticut. Occurs on aspen.

980 (1051). *EUSTICTUS CATULUS* (Uhler), 1894, 257.

Dull brownish- or grayish-yellow, clothed with gray pubescence; pronotum with a large subquadrate black spot on apical half, and vaguely spotted with black near base; scutellum shining black, a yellow spot each side at base, tip whitish; corium with small scattered brown spots, a larger blackish one on inner apical angle; cuneus ivory-yellow, its tip and margins black; membrane pale dusky-hyaline, veins and apical half darker; connexivum reddish, incisures blackish; legs dull yellow, vaguely spotted with brown; coxæ and sternum whitish; ventrals greenish-yellow, freckled with red, side margins with a broad black stripe. Joint 1 of antennæ black, 2—4 piceous-brown, 2 as long as clavus, 3 slightly longer than 1, 4 three-fourths as long as 3, its tip acute. Length, 5—6 mm.

Described from York Co., Pa., southern Texas and Cape St. Lucas, Lower California. Occurs on pine.

981 (—). *EUSTICTUS SALICICOLA* Knight, 1923, 482.

Elongate, sides subparallel, male; suboval, female. Color of pronotum as in key; scutellum dark brown or black, basal angles pale; elytra pale translucent, glabrous, clavus black each side of commissure, corium with punctures, radius and a large spot on inner apical angle, dark fuscous, outer edge of embolium often blackish; cuneus pale translucent, inner apical margin darker; membrane pale hyaline, cells dusky, margins of apical half pale fuscous; legs dull yellow, apical half of femora spotted with blackish; tibiæ each with four pale bands and numerous dark spots; ventrals pale greenish-yellow, spotted with reddish. Joint 1 of antennæ pale, flecked with black spots, two-thirds as long as width of head across eyes; 2 dark fuscous, extreme base paler, nearly three times as long as 1; 3 blackish, paler apically, two-fifths as long as 2; 4 blackish, one-fifth shorter than 3. Length, 7—7.5 mm.

New Ulm and St. Paul, Minn., June 18 (*Minn. Univ. Coll.*). Recorded from Mississippi, Minnesota and North Dakota. Occurs on bark of willow.

II. DIPLOZONA Van Duzee, 1915, 112.

Short, oval, subglabrous, strongly punctate species having the head nearly horizontal, slightly exerted; vertex as in *a* of generic key, without a basal carina; eyes large, prominent, widely separated; beak reaching hind coxæ; pronotum trapezoidal, sides feebly sinuate, narrowly margined, collar conspicuous, disk behind calli convex, strongly declivent, hind angles obtusely rounded, basal margin broadly curved; elytra entire, cuneus feebly deflexed, membrane 2-celled, surpassing abdomen by half its length. One species is known.

982 (1055). DIPLOZONA COLLARIS Van Duzee, 1915, 114.

Dull brownish-yellow, glabrous or nearly so; vertex with a vague fuscous blotch enclosing a median pale spot; apical three-fourths of pronotum fuscous, with median line and a spot each side pale; collar and basal fourth of pronotum dull yellow; scutellum blackish, its basal angles and a short median apical stripe pale; clavus and apical half of corium more or less clouded with fuscous; embolium pale yellow, its outer edge with minute fuscous punctures; cuneus hyaline, its tip and that of embolium reddish-brown; membrane with apical third dusky, remainder hyaline, veins darker; legs pale yellow, hind ones with apical third of femora and two rings on tibiæ and their tips, reddish-brown; under surface dull yellow, a stripe on sides and genital plates darker. Antennæ stout, half the length of body, joint 1 piceous-brown, as long as width of body, 2 dull yellow, the clavate apex reddish; 3 and 4 fuscous-brown, fusiform, their bases very narrow. Entire upper surface except head and membrane, rather thickly, coarsely and evenly punctate. Length, 4—5 mm.

Dunedin, Fla., Oct. 25—April 23; taken both on Hog Island and mainland by beating foliage of buttonwood, *Conocarpus erecta* L., and sweeping herbage along the bay front; also at porch light. Described from Punta Gorda and Estero, Fla., and not recorded elsewhere. Easily known from all other members of the subfamily by the peculiar structure of the antennæ.

III. EURYCHILOPTERELLA Reuter, 1909, 59.

Oblong-oval, convex, punctate species having the head porrect, front feebly declivent, eyes not contiguous with pronotum, vertex with base margined; antennæ with joint 1 not reaching tip of tylus, 2 as in key, 3 and 4 united much shorter than 2; pronotum trapezoidal, calli rather large, covering the apical third, disk behind them convex, declivent, sides straight; scutellum subequal in length to commissure, convex; elytra entire, surpassing tip of abdomen, cuneus nearly horizontal; legs short. One species is known.

983 (1056). EURYCHILOPTERELLA LURIDULA Reuter, 1909, 60.

Dull grayish- or greenish-yellow, very thickly clothed with suberect yellowish hairs; front of head, calli and four oblong-oval spots on basal half of pronotum, scutellum in great part, apical half or more of clavus, inner apical third of corium and cuneus in great part, fuscous-black; embolium and median line of scutellum pale dull yellow; membrane dusky translucent, its veins darker; under surface blackish-brown, shining, gula and prosternum paler; legs greenish-yellow, tinged with fuscous. Beak brown, reaching first ventral. Antennæ half the length of body, thickly pilose, joints 1 and 2 greenish-yellow, 1 about half as long as width of vertex; 2 darker and visibly thickened toward apex, almost four times as long as 1; 3 and 4 fuscous-brown, united two-thirds the length of 2. Head as in *c* of key, the tylus and cheeks convex, prominent. Pronotum two and one-half times as wide at base as apex, disk behind calli convex, thickly, evenly and rather coarsely punctate. Scutellum finely transversely rugose. Elytra, except membrane, very finely, unevenly and shallowly punctate, each puncture bearing an inclined yellowish hair. Length, 4.2—4.5 mm.

Chicago, Ill., Sept. 12; taken from elm (*Gerhard*). Recorded only from New York and District of Columbia, where it is said to occur on yellow-wood, *Cladrastis lutea* (Michx.); also on apple trees and to be evidently predaceous.

IV. CAMPTOBROCHIS⁹⁰ Fieber, 1858, 304.

Small oblong-oval, subconvex, shining species having the upper surface glabrous; eyes almost contiguous with pronotum; vertex carinate at base; scutellum punctate; tarsal claws deeply cleft near base. Male with "left clasper tapering gradually to a point, therefore without a barb or hook at tip as in the species of *Deraeocoris*." The adults hibernate and are probably predaceous. Five species are known from the eastern states.

KEY TO EASTERN SPECIES OF CAMPTOBROCHIS.

- a. Upper surface not red and black.
- b. Cuneus infuscated or with blackish; membrane marked with fuscous.
- c. Membrane nearly clear, but with a small round submarginal fuscous spot each side on apical half; host plant, bur oak.
- cc. Membrane with apical half infuscated, without distinct spots, but paler near tip of cuneus; disk of pronotum often blackish behind calli, the median line pale; femora piceous, apical half with one or two pale rings; host plants, white and red pines.

984. NEBULOSUS.

985. NUBILUS.

⁹⁰Knight (1921) made this group a subgenus of *Deraeocoris*. The characters used by him in separating it as a subgenus are mainly those used in my generic key and are more distinctive than those separating many other genera of Miridæ. I therefore restore the old generic name.

bb. Cuneus red or stained with reddish; membrane hyaline or with only a fuscous spot at apex or a point each side of middle.

d. Second antennal as long or longer than pronotum; membrane fuscous at apex; calli and scutellum in great part fuscous-black; cuneus red; host plants, smooth alder and white pine.

986. PÆCILUS.

dd. Second antennal shorter than pronotum; membrane with two fuscous spots on apical half, sometimes with a brownish cloud behind the spots.

987. ORNATUS.

aa. Upper surface bright red; clavus, two spots on pronotum and two on corium, black.

988. HISTRIO.

984 (1058). CAMPTOBROCHIS NEBULOSUS Uhler, 1872, 417.

Dull greenish-yellow, shining, glabrous; two stripes on head, calli and middle of disk of pronotum behind them, scutellum in great part, apical halves of clavus and corium, and apex of cuneus, black or heavily tinged with blackish; basal angles and apex of scutellum, a small spot each side of basal half of cuneus and the osteolar duct, calloused ivory-white; membrane as in *c* of key; femora dark brown, the knees paler; tibiæ and tarsi dull yellow, the former with two brown rings; propleura dull yellow, coarsely punctate; ventrals shining black, sparsely and minutely pubescent. Joint 1 of antennæ dark brown, almost glabrous, three-fourths as long as width of vertex, 2 brownish-yellow, sometimes fuscous at base and apex, distinctly pubescent, one-fourth longer than pronotum, male, about as long as pronotum, female; 3 and 4 more slender, fuscous, subequal in length. Beak reaching between the middle coxæ. Pronotum one-half wider at base than long, sides straight, narrowly margined; calli large, minutely punctate, remainder of disk coarsely and unevenly punctate, hind margin sinuate. Scutellum nearly flat, its middle third sparsely punctate. Elytra, except membrane, coarsely and rather sparsely punctate. Tarsal claws and arolia as in pl. X, 29. Length, 3.5–4.2 mm.

Frequent throughout Indiana, March 20—Sept. 11. Istokpoga, Fla., March 30. Recorded heretofore definitely only from Monticello, that State. In Indiana and elsewhere in the North it hibernates as imago beneath bark, bunches of dead leaves and other cover. In summer it has been swept from flowers of Jersey tea and foliage of various weeds and, especially in early autumn, often flies to light, four of the specimens at hand having been taken from my desk while at work at night. Ranges from Quebec and New England west to the Pacific and southwest to Florida, Texas and Arizona.

985 (—). CAMPTOBROCHIS NUBILUS (Knight), 1921, 106.

Dull greenish- or grayish-yellow, glabrous or nearly so; vertex with two curved stripes and tylus with two lines black; collum and calli shining black, the latter in female with front margin and a wedge-shaped spot between their front halves yellow; disk of pronotum behind calli with

or without fuscous blotches; scutellum brown, the side margins and tip yellow; narrow edges of embolium and commissure blackish; tibiæ greenish-yellow with two rings and tips darker; coxæ pale, tarsi fuscous; ventrals shining blackish-brown, finely and sparsely pubescent. Antennæ dark brown, middle of joint 2 paler; joint 1 nearly three-fourths as long as width of vertex; 2 almost four times as long as 1, male, three times as long, female; 3 and 4 subequal, each one-third the length of 2. Pronotum two-thirds wider at base than long, sides and basal margin slightly sinuate, disk finely and sparsely punctate. Elytra, including cuneus, similarly punctate; scutellum more coarsely and sparsely so. Length, 4.2—4.8 mm.

Ithaca, N. Y., Feb. 13 (*Davis*). Ranges from Newfoundland and New England west to Minnesota and Nebraska and southwest to North Carolina; hibernating beneath bark and other cover. Probably predaceous on the pine bark aphid, *Chermes pinicorticis* (Fitch).

986 (1060a). CAMPTOBROCHIS PÆCILUS McAtee, 1919c, 246.

Pale brownish-yellow, shining, glabrous; head with two stripes on vertex, bent behind at right angles and reaching eyes, piceous; tylus with two narrower similar stripes; pronotum with front margin of calli and wedge-shaped projection between them, collar, very narrow median line of hind lobe and edge of hind margin, yellowish; scutellum with side margins of basal half and apex ivory-white; corium with two spots on apical third dark brown; cuneus bright red, yellowish at base, the margins of apical half brown; membrane as in key; femora with basal two-thirds shining brown, apical third and knees paler; tibiæ dull yellow with two rings and apical fourth brown; tips of beak and tarsi fuscous. Antennæ dark brown, middle third of joint 2 often yellow; joint 1 as long as width of vertex, 2 three and a fourth times longer than 1, 3 one-third the length of 2, 4 slightly longer than 3. Pronotum two-thirds wider at base than long, rather coarsely, evenly, not densely punctate. Scutellum more coarsely and closely punctate. Clavus coarsely, corium more finely and sparsely punctate. Length, 4.2—5 mm.

Swannanoa and Fair Bluff, N. Car., July—Sept. (*Brimley*). Ranges from New England west to Illinois and southwest to North and South Carolina. Described by Reuter (1909, 59) as *Camptobrochis validus cunealis*, but his varietal name was preoccupied. McAtee found the adults hibernating beneath bark of birch, sycamore and maple, near Great Falls, Va. He collected the nymphs in August from *Alnus rugosa*.

987 (—). CAMPTOBROCHIS ORNATUS (Knight), 1921, 99.

Head reddish-brown; cheeks, loræ, tip of tylus and two impressed spots on vertex, piceous; pronotum grayish-testaceous, punctate with fuscous, margins and vague median line of disk paler, calli black, their margins reddish-brown; scutellum reddish-brown to piceous, apex and side

margins ivory-white; mesoscutum black, narrowly or not at all exposed; elytra grayish-yellow subtranslucent, narrow area each side of commissure, spot on middle and narrow apical margin of corium, piceous; cuneus reddish-translucent, outer margin yellowish, narrowly piceous on apical half of inner margin; membrane as in key; femora reddish-brown, basal half piceous; tibiæ dull yellow, two rings and apical fourth reddish or piceous; sternum fuscous, opaque; ventrals dark red to piceous, shining. Joint 1 of antennæ reddish-brown, darker apically, one-third as long as width of head across eyes; 2 brown, vaguely reddish at middle, slightly shorter than length of pronotum; 3 and 4 dark brown with pale pubescence, subequal in length, each as long as width of vertex. Beak reaching between middle coxæ. Length, 4.5—4.8 mm.

Bigelow, Mo., Aug. 28 (*Barber*). Recorded from Illinois, Missouri, Nebraska and South Dakota.

988 (1063). CAMPTOBROCHIS HISTRIO (Reuter), 1876, 75.

Head, two large spots on pronotum, basal two-thirds of clavus, a triangle at base and a large round spot each side on apical third of corium and tip of cuneus shining black; basal carina of vertex and collar yellow; membrane dusky, translucent, the cells and veins darker; remainder of upper surface bright red or greenish-yellow strongly tinged with red; legs and under surface black, shining, tibiæ each with two pale rings, tarsi and beak fuscous-brown. Joint 1 of antennæ black, subglabrous, as long as width of vertex; 2—4 fuscous-brown to blackish, distinctly pubescent; 2 thickened toward apex, nearly three times as long as 1; 4 slightly longer than 3, the two united four-fifths as long as 2. Pronotum two-thirds wider at base than long, sides nearly straight, strongly converging from the base; apex three-fifths as wide as base; disk convex, coarsely and rather sparsely punctate, humeral angles obtusely rounded, basal margin feebly sinuate. Scutellum coarsely, sparsely punctate. Elytra evenly, rather thickly and coarsely punctate. Length, 4.6—5.2 mm.

Occurs throughout Indiana but apparently scarce. Found throughout the year. Two specimens were taken in Vigo Co., Feb. 23, 1893, from beneath the close fitting bark of a black oak (*Quercus velutina* Lam.) log which lay on the side of a high sandy hill near the Wabash River. Eight others were taken Oct. 13, 1899, from beneath the bark of a gray pine, *Pinus divaricata* (Ait.) on the top of a high sand dune near Millers, Lake Co., Ind. It is therefore seen to be gregarious while hibernating. In summer it has been taken singly or in pairs in Marion and Knox counties, by sweeping along the margins of ponds and marshes. Ranges from New York west to Minnesota, Montana and California. Not recorded in the east south of Maryland except by Reuter from "Texas and Carolina." That author founded for *histrion* (loc. cit.) the genus *Callicapsus* which he

afterward (1909, 58) merged with *Camptobrochis*. It was retained by Van Duzee as a subgenus of *Camptobrochis*.

V. *DERÆOCORIS* Kirschbaum, 1855, 191, 208.

Oval or oblong-oval, rather robust, usually subglabrous species, having the head short, broader than long, subporrect, wider across eyes than apex of pronotum, vertex margined behind; eyes large, widely separated; beak reaching upon or slightly passing middle coxæ, rarely (*grandis*) reaching second ventral; antennæ inserted slightly above the lower margin of eyes, almost half the length of body, the joints variable in length as to species; pronotum trapezoidal, collar narrow but distinct, disk rather coarsely punctate, wider at base than long, sides usually straight, calli oval, smooth, shining; scutellum triangular, nearly equilateral; elytra entire, surpassing tip of abdomen, usually more elongate in males, cuneus rather strongly deflexed, fracture deep; legs rather long, hind femora moderately swollen, tibiæ beset with prominent hairs, the middle and hind ones usually also with one or two rows of spines. The genus is a very large one and has a world-wide distribution. Knight in his monograph (1921) stated that in the genus *Deræocoris*, as recognized by him, there now belong 146 species and 62 varieties. Of these (exclusive of the genus *Camptobrochis*, as above separated), 44 species and 20 varieties occur in North America, 31 species and 18 varieties having been described by him as new in the paper cited. Of them he says:

"I have been able to associate with definite host plants all but two of the known eastern species as well as certain of those found in the southwestern states. In several instances this relation appears to be more dependent on the predaceous habits of the bugs which feed largely on the aphids or plant lice found on particular hosts, rather than the sap from the plant. In fact I have not detected a single case where the bugs have fed on the foliage of a plant and produced the characteristic leaf-bug injury which is always to be seen on plants infested by true leaf-feeders. The general scarcity of these insects as compared with leaf-feeding species is only another indication of their predatory habits, for predaceous forms never attain great abundance except sporadically in favored spots."

Our eastern species of *Deræocoris*, as here limited, are separated into four groups as follows:

KEY TO GROUPS OF EASTERN SPECIES OF *DERÆOCORIS*.

- a. Scutellum punctate; tarsal claws deeply cleft near base (pl. X, fig. 30).

GROUP A, p. 893.

- aa. Scutellum impunctate.
- b. Tarsal claws deeply cleft near base.
- c. Upper surface practically glabrous, at most only sparsely and finely pubescent; hind tibiæ with a row of spines or heavily chitinated hairs on the front face; form elongate-oval.
GROUP B, p. 894.
- cc. Upper surface heavily pubescent or hairy, at least with long hairs near the front angles of pronotum; hind tibiæ without distinct spines on the front face, usually rather closely set with long prominent hairs.
GROUP C, p. 901.
- bb. Tarsal claws not or very slightly cleft (pl. X, fig. 28).
GROUP D, p. 902.

GROUP A.—DERÆOCORIS.

This group is represented in this country only by the European species *Deræocoris ruber* (Linn.) and four color varieties as recognized by Knight. These he separated as follows:

KEY TO SPECIES AND VARIETIES OF GROUP A, DERÆOCORIS.

- a. Head except tylus, pronotum, scutellum and elytra except apex of cuneus, reddish. 989. RUBER.
- aa. Elytra or pronotum, or both, more or less blackish.
- b. Elytra reddish, pronotal disk black or largely blackish. 989a. var. BICOLOR.
- bb. Elytra and pronotum more or less blackish.
- c. Pronotal disk largely, scutellum, corium and embolium, except apically, reddish. 989b. var. DANICUS.
- cc. Pronotum, scutellum, elytra except narrowly at base of corium and embolium, black.
- d. Cuneus reddish on the basal half. 989c. var. SEGUSINUS.
- dd. Cuneus entirely black. 989d. var. CONCOLOR.

989 (1071). DERÆOCORIS RUBER (Linnæus), 1758, 446.

Rather broadly oval; glabrous, shining. Head dull yellow, tinged with reddish, tylus brown or black; pronotum, scutellum, clavus and corium straw-yellow, usually in part or wholly heavily tinged with reddish; embolium and outer margin of cuneus pale translucent yellow; cuneus bright red, its tip black; membrane fuscous, a large spot opposite tip of cuneus paler; legs dull reddish-yellow, femora, except apical fourth, piceous, tarsi fuscous; ventrals and meso- and metasterna shining piceous-black, their sides and prosternum reddish-yellow. Joint 1 of antennæ piceous, nearly as long as head; 2 three times as long as 1, piceous, paler at middle, distinctly stouter toward apex, the clavate portion thickly beset with inclined blackish bristle-like hairs; 3 yellowish, dusky at tip, two-fifths as long as 2; 4 dusky brown, one-half the length of 3. Pronotum two and two-third times wider at base than apex, sides straight, hind angles broadly rounded, basal margin sinuate; disk convex, rather sparsely, finely and irregularly punctate. Scutellum sparsely and finely punctate. Corium rather finely, closely and shallowly punc-

tate, clavus more coarsely and rugosely so; costal margins parallel on basal two-thirds, thence feebly rounded to apex. Tarsal claws and arolia as in pl. X, fig. 30. Length, 7.2—8 mm.

Brooklyn, N. Y., July 14, on rose (*Davis*). An introduced European species recorded in this country only from Massachusetts, Connecticut, New York and Pennsylvania. As far as known it is predaceous in habits, without definite host plant. Douglas & Scott (1865, 442) mention it as: "Common everywhere in the London district on nettles and bramble flowers in July and August."

The form above described is that of typical *ruber*. Of the varieties Knight (1921, 194) says: "All the varieties of *ruber* are merely melanic color forms, each particular color phase being an index to the conditions of environment under which the bug developed." Probably the best marked one is var. *seguinus* Muller (1766, 191), which Davis found at Staten Island, N. Y.. July 10, on red raspberry.

GROUP B.—DERÆOCORIS.

Elongate-oval, glabrous robust species with the width less than one-half the length; ground color generally dull grayish-yellow, marked with fuscous punctures or blotches; scutellum smooth; hind tibiæ spinose in front; tarsal claws deeply cleft near base. This group comprises nine species and two color varieties from the eastern states. All but two of the species have been described since the Van Duzee Catalogue was issued.

KEY TO EASTERN SPECIES OF GROUP B, DERÆOCORIS.

- a. Tibiæ banded or spotted with fuscous-brown or pale, rarely (*borealis*) wholly dark without distinct bands.
- b. Membrane with a large rounded fuscous spot on apical half, this frequently united at base with a fuscous streak which extends down from between the cells, thus leaving a large pale spot each side of middle and bordering apex of cuneus.
- c. Calli usually solid black with a broad piceous ray behind each, in pale specimens somewhat brownish with the rays behind them dark brown or wanting, the pronotal disk then with a narrow median line and margins pale; clavus and corium in part piceous, embolium pale; host plant, alders. 990. *BOREALIS*.
- cc. Calli more or less brownish or pale without distinct rays behind them; elytra and pronotum more uniformly colored, either brownish-yellow or dark brown; host plants, apple, pear and *Cratægeus*. 991. *FASCIOLUS*.
- bb. Membrane usually somewhat infuscated, but without spot and streak as in b.

- d.* Beak reaching onto second ventral; membrane feebly or not at all infuscated; femora pale with two blackish bands on apical third; basal half of hind tibiæ with two fuscous bands; host plant, hickory. 992. *GRANDIS*.
- dd.* Beak reaching between hind coxæ; membrane, femora and hind tibiæ without the combination of markings mentioned in *d*.
- e.* Femora either wholly or with apical half uniformly dark; ventrals either shining reddish or dark chestnut brown; host plants, yellow birch and mountain maple. 993. *BETULÆ*.
- ee.* Femora with apical half distinctly banded or wholly pale.
- f.* Second antennal sparsely beset with suberect hairs which are three times as long as the thickness of the segment; pronotal disk with margins and median line pale, calli and a broad ray behind each of them black; vertex with a pale impressed spot each side next to eye; host plant, hoary alder. 994. *ALNICOLA*.
- ff.* Second antennal without long hairs; pronotal disk pale brownish-yellow or fuscous without distinct rays behind the calli; corium with a spot at middle and outer apical angle fuscous; host plant, elm. 995. *APHIDIPHAGUS*.
- aa.* Tibiæ uniformly pale or yellowish.
- g.* Apical third of hind femora with two brown or fuscous bands; calli with apical half pale or brownish and without distinct dark rays behind them; elytra nearly uniformly brownish-yellow or dark brown; membrane with a round brownish spot on apical half; host plants, beech and apple. 991a. *FASCIOLUS* var. *CASTUS*.
- gg.* Apical third of hind femora with but one fuscous band; apical half of membrane pale or tinged with dusky but without a round fuscous spot.
- h.* Upper surface dull greenish-yellow to brownish, often marked with fuscous or blackish, but never wholly dark brown or black; calli pale margined with black or wholly black.
- i.* Calli with only the margins black; upper surface rich brownish to fusco-brownish, shining; host plant, elm. 996. *NITENATUS*.
- ii.* Calli wholly black, rarely (var. *pallens*) with only the margins black.
- j.* Upper surface fuscous to blackish; pronotum and scutellum usually with a pale median line; corium without distinct fuscous spots; host plant, white oak. 997. *QUERCICOLA*.
- jj.* Upper surface pale brownish-yellow; corium with three small vague rounded fuscous or brownish spots, one at base, one at middle, the third on outer apical angle; host plant, bur oak. 997a. var. *PALLENS*.
- hh.* Upper surface, including calli and scutellum, a nearly uniform dark brown or black. 998. *DAVISI*.

990 (—). *DERÆOCORIS BOREALIS* Van Duzee, 1920, 354.

Color variable, usually pale brownish-yellow, marked with piceous or brownish; head pale with two lines on front, base and tip of tylus, dorsal margins of loræ and a spot beneath each eye, brown or blackish; pronotum

tum and calli as in key; scutellum brownish-yellow with piceous stripe each side, margins and tip of median line paler; elytra glabrous, shining, base of clavus and large spot on disk of corium piceous, embolium pale; cuneus pale translucent, its apex fuscous; membrane as in *b* of key; legs pale brownish-yellow, femora, especially the hind ones, darker toward tip; ventrals blackish in male, paler in female. Joint 1 of antennæ black or dark brown, slightly longer than width of vertex surpassing tylus by half its length; 2 brown or blackish, often pale at middle, pubescent with long pale hairs, three times the length of 1; 3 and 4 brownish to black, 3 two-fifths the length of 2; 4 three-fourths as long as 3, male, one-half as long, female. Beak reaching tips of middle coxæ. Length, 6.4—7 mm. (Fig. 186, *a*).

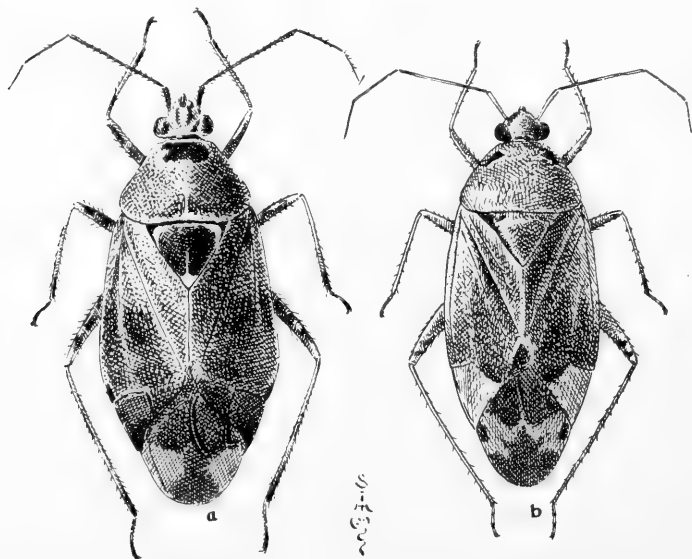


Fig. 186. *a*, *Deræocoris borealis* Van D. X 8; *b*, *Lygus hirticulus* Van D. X 10.
(After Drake, Tech. Publ. 16, N. Y. St. Coll. For.).

Quinz Lake, Quebec, Aug. 7 (*Van Duzee*). Ranges from Nova Scotia and New England west to Wisconsin and south to New Jersey. Occurs on alders in damp cool shaded places.

991 (—). *DERÆOCORIS FASCIOLUS* Knight, 1921, 123.

Brownish-yellow, marked with fuscous punctures; vertex with brownish transverse markings, tylus with two dark stripes; calli bordered behind with a transverse blackish line; scutellum either uniform dull yellow or brownish-yellow with two darker stripes; apical two-thirds of clavus and corium a somewhat darker brown than the remainder of elytra; basal half of embolium yellow dotted with small fuscous punctures, apical half darker; cuneus yellowish translucent, the tip brown; membrane as in *b* of key; legs and sterna greenish-yellow, hind femora with two brownish rings on apical third; tibiæ usually with two vague

brownish rings on basal third; ventrals pale brown with a reddish tinge. Joint 1 of antennæ subglabrous, dark brown, slightly longer than width of vertex; 2—4 pubescent, 2 dark reddish-brown, paler at middle, nearly three times as long as 1; 3 and 4 blackish-brown, 3 two-fifths as long as 2, 4 two-thirds the length of 3. Pronotum three-fifths wider at base than long, sides nearly straight; disk narrowly margined, rather coarsely, somewhat irregularly punctate, hind margin very slightly sinuate. Elytra coarsely, evenly, rather sparsely punctate. Length, 6.3—6.5 mm.

Marion, Martin and Lawrence counties, Ind., June 3—July 11; beaten from *Crataegus*. (W. S. B.). Muskegon, Mich., and Willow Springs, Ill., June 27—July 16 (Gerhard). Ranges from Quebec and New England west to North Dakota, British Columbia and Oregon, the distribution being mainly north of latitude 40°. Knight found it at Batavia, N. Y., on apple trees closely associated with the rosy apple aphid, *Anuraphis rosceus* Baker. "The white-wax-coated nymphs of the bug frequent the aphid-curved leaves, feeding on the aphids and honey-dew excretions."

991a (—). DERÆOCORIS FASCIOLUS CASTUS Knight, 1921, 125.

Differs from typical *fasciolus* only in color, the upper surface being a nearly uniform pale brownish-yellow, the tip of the cuneus alone usually distinctly darker; vertex and tylus with fuscous markings as there; calli wholly pale or in part suffused with brownish; embolium pale yellowish-hyaline throughout; legs almost wholly pale yellow, the brown markings of hind femora very small or wanting. Antennæ yellow, base of joint 1, apex of joint 2 and joints 3 and 4 more or less fuscous or dusky. Length, 6—6.5 mm.

Laporte and Marion counties, Ind., June 19—July 25 (W. S. B.). Holland, Mich., July 8 (Gerhard). Staten Island, N. Y., July 15 (Davis). The known range extends from Quebec and Massachusetts west to Michigan and Indiana. Not recorded south of New Jersey. Knight found it on beech at Ithaca, N. Y., where "it was associated with and predaceous upon the beech aphid, *Phyllaphis fagi* (L.), which rolls the leaves tightly from the margin." Hussey records it as "common in July on aphid-infested elms in the dune region of southwestern Michigan."

992 (1070). DERÆOCORIS GRANDIS (Uhler), 1887, 230.

Ground color above dark greenish- or brownish-yellow, with fuscous punctures; head with a stripe each side of vertex, two lines on tylus, and cheeks in part, dark brown. Pronotum with calli shining black, the area behind them fuscous-brown, with a vague wide paler median stripe; scutellum dark brown, the basal angles a narrow median line on apical half and tip pale; outer apical third of corium clouded with fuscous;

embolium and cuneus yellowish translucent with fuscous punctures, their tips darker; membrane a nearly uniform pale hyaline, the blackish color of the dorsum beneath showing through; legs pale yellow, marked as in key; ventrals dark chestnut-brown, shining, sparsely clothed with rather long prostrate yellowish hairs. Antennæ dull yellow, apex of joint 2 and apical halves of 3 and 4 dusky; joint 1 slightly longer than width of vertex; 2 very slender, slightly thickened and pubescent toward apex, three and a third times longer than 1; 3 two-fifths as long as 2, one-third longer than 4. Pronotum two and a half times as wide at base as apex, disk, except calli, coarsely irregularly punctate, with sides rather strongly declivent. Length, 6.5—7.2 mm.

Lake and Kosciusko counties, Ind., June 15—July 12. The known range extends from Ontario and New England west to Illinois and south to Maryland. Distinguished principally by the long beak. Knight's specimens were taken on young hickory trees in July. He states (1921, 128) that Uhler: "In describing *grandis* had under observation at least four different species and made allowance to cover all the forms which he took to be merely variations. Nearly every species collected from the United States that is larger than *nebulosus* has at one time or another stood under the name *grandis*."

993 (—). *DERÆOCORIS BETULÆ* Knight, 1921, 129.

Ground color above ranging from brownish-yellow to fuscous-brown; vertex with a large black spot, tylus and calli wholly shining black; pronotum behind calli fuscous-black in darker forms, with only fuscous punctures in the paler ones; scutellum black with basal angles paler, or pale with two oblong brown spots; corium in dark specimens rather heavily tinged with fuscous; cuneus with inner margin and tip fuscous to blackish; membrane in great part fuscous, paler on sides near tip of cuneus; femora dark brown or black, the knees and extreme base pale; tibiæ yellow with two broad rings and apex dark brown; ventrals of pale specimens as in key, of dark ones shining blackish-brown, their sides rather thickly pubescent; meso- and metasterna opaque black. Antennæ in dark specimens with joints 1 and 2 black, the base of 2 paler, 3 and 4 dusky brown; in pale ones, 1 dark brown, 2—4 yellowish, pubescent, the apex of 2 and 4 darker; joint 1 slightly longer than width of vertex, 2 three and a fourth times longer than 1, 4 two-thirds as long as 3. Beak reaching apex of middle coxæ. Pronotum two-thirds wider at base than long, sides straight, narrowly margined, disk rather coarsely, irregularly punctate, more finely so near base; hind margin feebly sinuate. Elytra rather coarsely, evenly, not densely punctate. Length, 6.8—7.5 mm.

Staten Island and Rossville, N. Y., June 9—20 (*Davis*). Ithaca, N. Y., July 2 (*Gerhard*). Ranges from Maine west to Pennsylvania and south to New Jersey. The types of Knight were taken at Ithaca July 2, on a large yellow birch, *Betula lutea*

Michx., "mostly from among clusters of aphid-deformed leaves."

994 (—). DERÆOCORIS ALNICOLA Knight, 1921, 132.

General color brownish-yellow with fuscous punctures; scutellum yellow with a broad brown stripe each side of middle; outer apical half of corium usually tinged with fuscous-brown; cuneus yellow, the tip brown; membrane dusky translucent, paler on sides; legs pale yellow, apical third of femora and two rings on all tibiæ brown; under surface as in *betulæ*. Antennæ with joint 2 yellow, darker toward tips, sparsely beset with long erect hairs, three and one-half times longer than 1; 3 and 4 dusky, 4 three-fourths as long as 3. Length, 6.5—6.8 mm.

McLean Bogs, Tompkins Co., N. Y., July 3 (*Gerhard*). Recorded only from Ottawa, Ontario, Connecticut, and New York. Taken only on *Alnus incana* (L.).

995 (—). DERÆOCORIS APHIDIPHAGUS Knight, 1921, 134.

Dull brownish-yellow, thickly marked with fuscous punctures; head with a bar at base of vertex, some transverse lines each side of front and two lines on tylus, brown or black; calli with basal three-fourths shining black, apical fourth yellow; scutellum brown with narrow median line and lateral stripes pale; corium usually with a dark brown blotch on middle and another on outer apical angle; embolium and cuneus pale translucent yellow marked with small brownish punctures, the tips brownish; membrane dusky translucent, the veins darker; legs pale yellow, apical third of middle and hind femora and basal halves of their tibiæ each with two brown rings; ventrals blackish-brown, shining. Antennæ dull yellow to fuscous-brown, joint 1 slightly shorter than width of vertex, 2 three times as long as 1; 3 and 4 united three-fourths the length of 2. Beak reaching between the middle coxæ. Pronotum nearly three-fourths wider at base than long, sides and basal margin distinctly sinuate, disk rather coarsely and unevenly punctate. Elytra more finely and evenly punctate. Length, 6—6.3 mm.

Willow Springs, Ill., and Twin Lake, Minn., June 29—July 3 (*Gerhard*). Washington, D. C., June 26 (*Davis*). Ranges from Nova Scotia, Ontario and New England west to the Dakotas and Colorado and south to Virginia. Knight states that he has found it "breeding only on elm and in the curled leaves infested with the aphid, *Schizoneura americana* Riley."

996 (1070a). DERÆOCORIS NITENATUS Knight, 1921, 141.

Head yellow with oblique transverse marks on vertex and two lines on tylus brown; pronotum with collar, calli and median line pale yellow, remainder dull yellow, more or less blotched with patches of blackish-brown punctures, the calli each with a curved brown dash; scutellum yellow, usually with two vague brown stripes; corium in great part dark brown, clavus and embolium, except toward their tips, paler; cuneus yellow, the tip brown; membrane yellowish-hyaline, the veins and apical

third of cells darker; legs pale yellow, hind femora often with a vague ring near apex; under surface pale to dull yellow, the sides with a row of fuscous spots. Joints 1 and 2 of antennæ yellow, the apex of 2 and all of 3 and 4 pale fuscous-brown; joint 1 slightly longer than width of vertex, 2 three times as long as 1, 3 and 4 united, one-sixth shorter than 2. Beak reaching apex of middle coxæ. Pronotum two and a half times wider at base than apex, sides straight, disk finely, sparsely, irregularly punctate. Clavus and corium rather finely, evenly and sparsely punctate. Length, 5.7—6 mm.

St. Anthony Park, Minn., August 5 (*Gerhard*). Staten Island, N. Y., August 3 (*Davis*). Ranges from Quebec and New England west to North Dakota and Colorado and southwest to North Carolina. Predaceous on *Eriosoma lanigerum* (Hausm.), the aphid which forms the rosette gall of elm leaves. The bug is the *Camptobrochis nitens* Reut. (1909, 56), a preoccupied name. The relatively smaller size, pale calli, polished brown hue of corium and almost wholly pale scutellum and legs are the principal characters separating this species from its allies.

997 (—). *DERÆOCORIS QUERCICOLA* Knight, 1921, 138.

Darker than *nitenatus*; head with brown markings as there; calli black, their front margins and a wedge-shaped spot between their front halves, yellow; disk behind them usually brown with sides and a vague median line pale; scutellum yellow, normally with two wide brown stripes; elytra brownish-black to piceous, darkest on middle and outer apical half of corium, clavus, basal half of corium and embolium except near apex, pale brownish-yellow with fuscous punctures; cuneus and membrane as in *nitenatus*; legs pale yellow, hind femora usually with one or two small brown spots near apex; ventrals dull yellow, their spiracles and median line darker. Antennæ yellow, the apical joints dusky; the relative length of segments nearly as in *nitenatus*. Pronotum narrower with sides less convergent and more sinuate than there, the base but slightly more than twice as wide as apex, disk more finely and evenly punctate. Length, 5.8—6 mm.

Harrison Co., Ind., June 9 (*W. S. B.*). Long, Pine and Staten Islands, N. Y., June 19—July 25 (*Davis*). Glen Ellyn and Chicago, Ill., June 19—July 4 (*Gerhard*). Ranges from Quebec and New England west to Minnesota and Colorado and south and southwest to Georgia and New Mexico, occurring for the most part on *Quercus alba*. The var. *pallens* Knight (1921, 140) is distinguished only by the characters given in key and is recorded from New York, Minnesota, South Dakota and New Mexico.

998 (—). *DERÆOCORIS DAVISI* Knight, 1921, 140.

Head dull yellow, vertex with five or six oblique spots and tylus with two lines brown; pronotum, clavus and inner half of corium dark brown

to black; embolium, basal half of cuneus and usually the outer half of corium dull translucent yellow with fuscous punctures; scutellum dark brown, a spot on each basal angle and tip pale; apical half of membrane pale, basal half and veins fuscous-brown; legs pale yellow, hind femora often with a dark spot near apex; ventrals brownish-black, paler on sides, sparsely and finely pubescent. Antennæ pale yellow, joints 3 and 4 in part dusky-brown; joint 1 slightly longer than width of vertex, 2 three times as long as 1, 3 as long as head, 4 four-fifths the length of 3. Beak reaching base of hind coxæ. Pronotum more than twice as wide at base as apex, sides nearly straight, narrowly margined; basal margin slightly sinuate, narrowly pale; disk finely and closely punctate. Corium finely and sparsely punctate, clavus more coarsely and closely so. Length, 5.3 mm.

Marshall Co., Ind., June 11 (*W. S. B.*). Staten Island, N. Y., June 18 (*Davis*). Recorded only from New York and Spring Hill, Ala.

GROUP C.—DERÆOCORIS.

This group as characterized in the key, p. 893, is represented in the eastern states by but a single species with several color varieties.

999 (1067). *DERÆOCORIS SAYI* (Reuter), 1876, 76.

Elongate-oval, robust. Dark fuscous-brown to black, sparsely clothed with rather long inclined yellowish hairs; head, scutellum, collar and edges of side margins of pronotum, dull yellow; embolium and cuneus brownish translucent; membrane fuscous-brown, the veins darker; femora dark brown to blackish with a pale ring near apex; tibiæ dull yellow with two rings on basal half and tip brown; tarsi and beak fuscous-brown; under side of head and prosternum dull yellow, meso- and metasternum opaque black, ventrals dark chestnut-brown, shining. Antennæ dark brown, thickly beset with suberect hairs; joint 1 as long as width of vertex, 2 cylindrical, about three times as long as 1, 3 slightly longer than 1, 4 two-thirds the length of 3. Beak reaching between middle coxæ. Pronotum with base nearly two and a half times as wide as apex, sides straight, calli large, smooth, feebly convex, remainder of disk coarsely and evenly punctate. Elytra more finely and more thickly punctate. Tibiæ beset with numerous long erect bristle-like hairs. Length, 7.5—8 mm.

Vermilion Co., Ind., June 12 (*W. S. B.*). Glen Ellyn, Ill., June 19 on oak (*Gerhard*). Raleigh, N. Car., early May (*Brimley*). Ranges from New York west to Minnesota and southwest to North Carolina, St. Augustine, Fla., Alabama and Texas. Occurs on various species of oak.

In addition to the typical form as above described, Knight (1921, 175) has given names to five color varieties, which he separates as follows:

KEY TO COLOR VARIETIES OF DERÆOCORIS SAYI.

- a. Scutellum pale or red.
- b. Side margins of pronotum black or only narrowly pale at apical angles; front of head blackish. 999a. var. *FRONTALIS*.
- bb. Side margins of pronotum broadly pale or reddish.
- c. Embolium black like the corium. 999b. var. *MARGINATUS*.
- cc. Embolium pale and cuneus more or less translucent. 999c. var. *COSTALIS*.
- aa. Scutellum black or only the median line pale apically.
- d. Femora black, annulated with pale near apex. 999d. var. *UNICOLOR*.
- dd. Femora pale on basal half, broadly annulated with black at apical third. 999e. var. *FEMORALIS*.

Of these varieties Knight records *frontalis* from Glen Ellyn, Ill.; *costalis* from Massachusetts, New York and Illinois; *unicolor* from Illinois and Wisconsin; *marginatus* from Michigan, Illinois, Georgia and Florida, and *femoralis* from Minnesota.

GROUP D.—DERÆOCORIS.

Oblong or elongate-oval species of medium size having the scutellum smooth and tarsal claws without distinct cleft at base. This group comprises six of our eastern species.

KEY TO EASTERN SPECIES OF GROUP D, DERÆOCORIS.

- a. Upper surface practically glabrous, at most only finely and sparsely pubescent.
- b. Calli solid black or with only a small pale spot on each outer apical angle.
- c. Scutellum uniformly brownish; second antennal similar in both sexes, slender on basal half, thicker toward apex, its erect hairs as long as thickness of segment; apical half of hind tibiæ broadly pale. 1000. *APPALACHIANUS*.
- cc. Scutellum dark brown with basal angles and apex ivory-white; second antennal as thick at middle as on apical half, its erect hairs in female three times as long as thickness of segment; apical half of hind tibiæ dark brown with a vague median pale ring; host plant, tamarack. 1001. *LARICICOLA*.
- bb. Calli with entire front margin ivory-white, this hue with a spur projecting obliquely inward from each apical angle toward middle of callus; second antennal as thick at middle as on apical half, its erect hairs not longer than thickness of segment; host plant, white pine. 1002. *PINICOLA*.
- aa. Upper surface thickly pubescent or at least with long hairs near front angles of pronotum.
- d. Hind femora with basal half pale flecked with two or three rows of small darker spots; apical half fuscous to blackish with a pale ring; tibiæ with two pale rings. 1003. *KENNICOTTI*.

dd. Hind femora uniformly dark brown or blackish.

e. Pronotum, elytra and legs uniformly dark brown, the paler subtranslucent areas of elytra stained with brownish; apical half of hind tibiæ usually with a distinct pale ring; host plant, scrub pine. 1004. *NIGRITULUS*.

ee. Pronotum fuscous to blackish; elytra fuscous to blackish, the paler areas not stained with brown; hind tibiæ with a vague pale ring or none; gula, sides of tylus and front coxæ pale; host plants red and gray pines. 1005. *ALBIGULUS*.

1000 (—). *DERÆOCORIS APPALACHIANUS* Knight, 1921, 160.

Dark fusco-brownish; head paler brown with brownish-black markings; pronotum with calli and front margin of disk brownish-black; clavus and base of corium yellowish, subtranslucent, embolium paler; cuneus dark brown, paler at middle; membrane fusco-brownish, paler each side near tip of cuneus; legs reddish- or fuscous-brown, tips of coxæ and basal half of femora paler; tibiæ dark brown, their apical halves dull yellow; ventrals dark brown to piceous, shining. Antennæ dark brown, blackish apically, joint 1 almost as long as width of vertex, 2 three times as long as 1, the apical half visibly thickened, 3 two-fifths the length of 2, one-fourth longer than 4. Beak reaching middle of hind coxæ. Length, 6.2 mm.

Known only from Tryon, N. Car., where it was taken May 21 at light.

1001 (—). *DERÆOCORIS LARICICOLA* Knight, 1921, 164.

Dull greenish-yellow, thickly marked with fuscous punctures; vertex with four curved stripes and tylus with two lines, blackish; calli shining black, a small spot on each apical angle and another between them, yellow; apical half of corium with a large irregular brown blotch; embolium and cuneus dull translucent yellow dotted with fuscous, their tips darker; membrane dusky hyaline, the cells and sides paler, veins brown; tibiæ and apical halves of femora dark brown, the former with two pale or reddish rings; basal halves of femora, coxæ, prosternum and osteolar duct pale yellow; meso- and metasterna opaque black; ventrals shining black, paler at middle. Antennæ dark brown; joint 1 slightly longer than width of vertex; 2 subcylindrical, tapering at base, three times longer than 1; 3 and 4 united two-thirds the length of 2. Pronotum with sides strongly converging, base, especially in female, distinctly flaring, two and a fourth times as wide as apex, disk coarsely, very irregularly punctate, with pale calloused areas between the punctures. Elytra more finely and more evenly punctate. Length, 6.2—6.5 mm.

Ithaca, N. Y., June 27 (*Davis and Gerhard*). Recorded only from Massachusetts, New York and Minnesota, but probably occurs on tamarack throughout most of the range of that tree.

1002 (—). *DERÆOCORIS PINICOLA* Knight, 1921, 162.

Pale brownish-yellow, thickly flecked with blackish punctures; head with the two curved median dark stripes broken to form oblique, trans-

verse marks; scutellum usually pale or dull yellow with two wide brown abbreviated stripes; apical third of corium and embolium more or less darkened with fuscous-brown, narrow line along base of cubitus pale; membrane translucent fuscous, paler near tips of cuneus, veins dark brown; legs black or dark brown, coxæ, trochanters and basal third of femora in part dull yellow, tibiæ with two vague paler rings; ventrals, in dark specimens, shining black, in pale ones, dull yellow with spiracles and median line blackish. Antennæ dark brown to black, joint 1 four-fifths as long as width of vertex; 2 three and one-half times longer than 1, feebly thickened from base to apex; 3 and 4 united two-thirds the length of 2. Pronotum shorter, with sides less convergent than in *laricicola*, hind angles more broadly rounded; disk, as well as that of elytra, rather finely evenly, not densely punctate. Tarsal claws and arolia as in pl. X, fig. 28. Length, 6—6.4 mm.

Ithaca, N. Y., July 13 (*Gerhard*). Wyandanch, L. I., N. Y., July 3 (*Davis*). Ranges from Ontario and New England west to Minnesota and south to Washington, D. C. Knight found the fifth stage nymphs in numbers on June 9 near Ithaca, N. Y., on white pine. They were living among and were pre-daceous upon the pine bark aphid, *Chermes pinicorticis* (Fitch) and were covered with a coat of white wax-like material similar to that of the aphids.

1003 (—). *DERÆOCORIS KENNICOTTI* Knight, 1921, 166.

Dull grayish-yellow; head with inner margin of eyes, some transverse bars each side of front, base of tylus, loræ and cheeks, black; calli and area in front of them shining black; scutellum black, basal angles and tip pale; elytra grayish-yellow, translucent; narrow edge and tip of embolium, apex of clavus, spots at base, near middle and on apex of corium, fuscous to blackish; basal half of cuneus pale with black punctures, apical half brownish-black; membrane fuscous, cells and a spot near tip of cuneus paler, veins darker; legs blackish, hind femora and tibiæ as in key; ventrals dark brownish-black, thickly pubescent. Joint 1 of antennæ dull yellow, darker toward base, one-tenth shorter than width of vertex; 2 testaceous, blackish toward apex, three and one-half times as long as 1; 3 and 4 blackish-brown, 3 two-fifths as long as 2, 4 one-tenth shorter than 3. Beak reaching between middle coxæ. Length, 5.7—6.7 mm.

Recorded only from Mt. Katahdin, Maine, and Great Slave Lake, Canada.

1004 (1068). *DERÆOCORIS NIGRITULUS* Knight, 1921, 170.

Color a nearly uniform dark reddish-brown, rather thickly clothed with long, suberect brown hairs; head often with tylus and basal margin of vertex paler; scutellum, embolium and cuneus concolorous with corium; membrane pale brownish-hyaline, its veins brown; legs and under surface brown, trochanters, tips of coxæ and osteolar duct paler; tibiæ with

a broad pale ring on apical half and thickly beset with long bristle-like hairs. Antennæ dark brown, beset with numerous long, suberect hairs; joint 1 slightly shorter than width of vertex, 2 three times as long as 1, 3 about two-fifths as long as 2, one-fourth longer than 4. Beak reaching base of hind coxæ. Vertex and calli smooth, shining, the latter rather prominent. Remainder of upper surface, except membrane, rather finely, evenly and thickly punctate. Length, 6—6.4 mm.

Washington, D. C., June 15 (*Gerhard*). Recorded only from there, Maryland and Virginia. Described by Reuter (1909, 55) as *Camptobrochis nigrita*, a preoccupied name.

1005 (—). *DERÆOCORIS ALBIGULUS* Knight, 1921, 171.

Color above a nearly uniform dark fuscous to black, thickly clothed with short, suberect yellowish hairs; a narrow stripe bordering eyes, sides of tylus, a spot on cheeks, very narrow basal margin of pronotum and basal angles and tip of scutellum, usually dull yellow; membrane dark smoky brown, the cells and sides near tip of cuneus paler; legs and under surface dark brown to blackish, the coxæ, prosternum and under side of head in great part dull yellow. Antennæ dark brown, pubescent, the joints relatively slightly shorter than in *nigritulus*. Beak reaching middle of hind coxæ. Pronotum three-fifths wider at base than long, sides strongly converging from the base; disk, except calli, densely and rather finely punctate. Clavus and corium somewhat rugose, rather finely and unevenly punctate. Length, 6.5—7.2 mm.

Lake and Marshall counties, Ind., June 11—28 (*W. S. B.*). Miller, Ind., June 27 (*Gerhard*). Taken from the gray or Labrador pine, *Pinus dicaricatus* (Ait.). Known only from New York, Michigan and Indiana. Larger and darker than *nigritulus* with pronotum more densely punctate.

Subfamily VIII. DICYPHINÆ Oshanin, 1912, 70.

Elongate, slender, usually glabrous species having the head wider across eyes than apex of pronotum, usually distinctly exerted with front subvertical; loræ linear, distinct; pronotum subcampanulate or trapezoidal, its collar prominent; elytra usually entire and surpassing tip of abdomen, often in great part largely hyaline; last tarsal joint slender, its claws sharply bent, not cleft near base; arolia usually absent or minute. Four genera are represented in the eastern states.

KEY TO EASTERN GENERA OF DICYPHINÆ.

- a. Hind margin of pronotum straight or nearly so, the mesoscutum but slightly exposed; basal margin of calli not passing apical third of pronotum; head, viewed from the side, not projecting before eyes; elytra elongate-oval, hyaline or glassy with red or dark markings; pseudarolia absent (pl. X, fig. 21). I. HYALIODES, p. 906.

- aa.* Hind margin of pronotum more or less concave, leaving mesoscutum broadly exposed; basal margin of calli nearly or quite reaching middle of pronotum; head, viewed from the side, distinctly surpassing front line of eyes; pseudarolia prominent (pl. X, figs. 18—20).
- b.* Pronotal disk distinctly transversely sulcate just behind calli; eyes large, vertical; head narrowed to form a distinct neck behind eyes. II. DICYPHUS, p. 907.
- bb.* Pronotal disk not transversely sulcate behind the calli.
- c.* Eyes large and vertical, the head space behind them short, not equal to half the width of an eye. III. CYRTOPELTIS, p. 911.
- cc.* Eyes small, oblique placed at middle of head, the space behind them subequal to lateral width of an eye. IV. MACROLOPHUS, p. 913.

I. HYALIODES Reuter, 1876, 83.

Elongate-oval, shining species having the head strongly narrowed behind eyes to form a distinct neck, its front vertical, vertex wider than the lateral width of an eye; pronotum subcampanulate, sides strongly converging from base to apex, hind portion convex with basal angles subnodulose; elytra narrowly oval, surpassing abdomen by half the length of membrane; corium, embolium and cuneus of nearly the same texture as membrane; cuneus but slightly deflexed, membrane one-celled. One of the two known species occurs in our territory.

1006 (1106). *HYALIODES VITRIPENNIS* (Say), 1832, 24; I, 345.



Fig. 187. X 8. (Original).

Pale straw-yellow; collar, calli, base and narrow side margins of scutellum and veins of membrane dark brown; head, clavus, edge of costal margin and legs dull yellow, often more or less tinged with red; scutellum usually white; transverse stripe across apex of corium bright red; remainder of elytra pale glassy hyaline; under surface pale yellow, often tinged with red, the sides of ventrals sometimes darker. Joint 1 of antennæ yellow, its apical half or more usually bright red, about as long as pronotum; 2 much

more slender, dull yellow, fuscous at apex, one-half longer than 1; 3 and 4 dusky, very slender, united two-thirds the length of 2. Beak reaching middle coxæ. Basal half of pronotum finely pubescent, dense'y and

coarsely punctate. Scutellum smooth, equilateral, impressed at base, its margins pubescent. Inner margin of embolium with a row of minute punctures. Length, 4.5—4.8 mm. (Fig. 187).

Frequent throughout Indiana, June 22—Sept. 22. Dunedin, Fla., March 13—20. In Indiana it occurs in numbers on jewelweed or touch-me-not, *Impatiens biflora* Walt., along the borders of streams and ponds in company with *Lygus pabulinus* (Linn.); also frequently beaten from wild grape. Not before recorded from a definite Florida station, and apparently very scarce in that State, but two having been taken at Dunedin. They were swept from ferns in a moist dense hammock. The known range extends from Quebec and New England west to Iowa and Kansas and southwest to North Carolina, Florida and Texas. Of it Uhler (1884, 287) wrote: "This elegant little insect lives in great numbers upon wild grapevines, but it is often equally common upon red and black oak, particularly in early autumn, where it may be seen searching for small tender insects and larvæ."

The color of *vitripennis* is exceedingly variable, the pronotum often being wholly pale, or with only a black spot at base; scutellum at times in part or wholly black; the dark stripe along the suture red or black, sometimes wholly wanting. The form above described is one extreme. The other is the variety *discoidalis* Reut. (1909, 61) in which the neck, collar, calli, wide median stripe on pronotum, clavus, commissure, line across tips of coria, veins of membrane and antennæ, except basal joint, are dark brown to blackish. All possible variations occur between the two extremes, so that the varietal name is superfluous.

II. DICYPHUS Fieber, 1858, 327.

Elongate, slender species having the front of head subvertical; tylus prominent, compressed; eyes large, separated from pronotum by a space subequal to width of an eye; vertex convex, not wider than the width of an eye, without basal carina; beak usually reaching or surpassing hind coxæ; antennæ about half the length of body, the joints variable in length; pronotum subcampanulate, its disk smooth and with a transverse impression both in front of and behind calli, hind margin usually broadly and deeply concave; mesoscutum strongly convex, usually widely exposed; scutellum relatively small, convex, its apical half usually with an obtuse longitudinal carina;

elytra entire, surpassing abdomen by half the length of membrane, cuneus horizontal, its fracture scarcely evident; front coxæ long, reaching or surpassing middle of mesosternum; joints 1 and 3 of hind tarsi subequal, 2 longest. Six species are known from our territory.⁹¹

KEY TO EASTERN SPECIES OF DICYPHUS.

a. Smaller, length not over 3.7 mm.

b. Corium with a large rounded black spot near apex; legs wholly pale yellow; basal margin of pronotum feebly concave, the mesoscutum only in small part exposed; length less than 3 mm.

1007. MINIMUS.

bb. Corium without a prominent rounded dark spot near apex; head black, with a large pale spot behind eyes; basal margin of pronotum widely and deeply concave, the mesoscutum in great part or wholly exposed, length, 3.5—3.7 mm.

1008. NOTATUS.

aa. Larger, length, especially of female, more than 4 mm.; basal margin of pronotum widely and deeply concave.

c. Head and pronotum both dark brown to black; collar and usually a line between calli pale; elytra in great part pale; osteole scarcely evident, the rim of its peritreme feebly elevated.

1009. AGILIS.

cc. Pronotum in great part dull yellow with only the sides darker; osteole distinct, the rim of its peritreme elevated, prominent.

d. Elytra with numerous red lines and streaks; eyes separated from pronotum by a space equal to dorsal width of an eye.

1010. FAMELICUS.

dd. Elytra more or less darkened with fuscous, rarely with red markings.

e. Second antennal wholly black; vertex shining black with a large pale spot behind it; elytra not conspicuously marked with fuscous; form very slender.

1011. VESTITUS.

ee. Second antennal with basal two-thirds or more yellow; vertex dull yellow; elytra conspicuously marked with fuscous.

1012. DISCREPANS.

1007' (1111). DICYPHUS MINIMUS Uhler, 1899, 59.

Head black, shining; disk of pronotum either pale fuscous with dark margins or wholly black, the collar pale yellow; scutellum fuscous to black with a yellowish triangular spot each side of base; elytra dull translucent yellow with widely scattered minute fuscous punctures, a large rounded spot or dot near apex of corium and the tip of cuneus dark brown or black; membrane pale dusky translucent, veins slightly darker; legs and under surface pale greenish-yellow, sides of ventrals and tips of tarsi darker. Antennæ blackish, joint 1 paler at base, slightly shorter than head; 2 twice as long and nearly as thick as 1; 3 and 4 more slender, 3 one-third longer than 2, 4 subequal in length to 2. Pronotum two-thirds wider at base than long, sides feebly concave, finely margined;

⁹¹The eastern records of *D. californicus* Stal (1859a, 259) are, as pointed out by Van Duzee (1917, 370) unreliable. It is therefore regarded as extralimital for this work.

disk minutely transversely wrinkled. Elytra very finely and sparsely punctate, minutely pubescent. Length, 2.8 mm.

Faywood, New Mexico, June 4 (*Gerhard*). Described by Uhler under the title, "A New Destructive Capsid," with the statement: "Numerous specimens of both sexes have been sent to me from various parts of Florida." No other record from that State. Recorded also from District of Columbia, New Mexico, Colorado and California.

1008 (—). *DICYPHUS NOTATUS* Parshley, 1922, 16.

Elongate, subparallel, male; suboval, female. Pronotum with collar and disk dull yellow, side margins and flanks black; elytra whitish-yellow, opaque, with vague reddish-brown areas on clavus, inner third and middle of corium; apical angles of corium and cuneus dark reddish-brown; membrane smoky-hyaline with a vague median dusky stripe, veins pale; legs pale yellow, femora with inconspicuous brown dots above and below; sterna black, ventrals dull yellow, their sides with brown or blackish margins. Joint 1 of antennæ pale, two-fifths longer than width of vertex; 2—4 black, 2 slightly shorter than length of head and pronotum united, 3 twice as long as 4. Pronotum twice as wide at base as long at middle, side and basal margins concave, front lobe smooth, shining, hind one sparsely punctate. Elytra indistinctly punctate, clothed with fine pale pubescence. Length, 3.5—3.7 mm.

Known only from Illinois and South Dakota. "Distinguished from all other American species of *Dicyphus* by its short antennæ, the second segment being scarcely as long as head and pronotum united, and by the large pale spot on base of head." (*Parshley*).

1009 (1108). *DICYPHUS AGILIS* (Uhler), 1877, 425.

Head and pronotum subglobose, color as in key; vertex often with a small yellowish spot near eye; mesoscutum dark brown; scutellum black, sometimes with a yellowish spot each side of base, both it and elytra very finely and sparsely pubescent; elytra dull greenish-white to pale straw-yellow, corium often with a vague pale fuscous stripe; apical half of clavus sometimes in part reddish; inner apical angle of corium and extreme tip of cuneus dark brown; membrane dusky translucent, veins brownish; legs yellow; tips of beak and tarsi fuscous or piceous; under surface shining brown, middle of ventrals yellow. Joints 1 and 4 of antennæ dull yellow, 2 and 3 pale to dark brown; 1 as long as width of vertex; 2 and 3 subequal, each about three times as long as 1; 4 one-third as long as 2. Pronotum about one-third wider at base than long; sides broadly concave, basal angles subdepressed, slightly prolonged; disk, except calli, finely transversely wrinkled and with a vague median impressed line. Length, 3.8—4.5 mm.

Marion Co., Ind., June 19; swept from the black raspberry, *Rubus occidentalis* L. Swannanoa and Highlands, N. Car., June—

July (*Brimley*). Georgetown, Colo., July 27 (*Gerhard*). Ranges from Quebec and New England west to the Pacific and south-west to North Carolina. Occurs on various species of *Rubus*.

1010 (1109). *DICYPHUS FAMELICUS* (Uhler), 1878, 413.

Pale greenish- or straw-yellow, shining; neck, narrow median line and impressions of pronotum, scutellum, inner margin and apical half of corium, inner apical margin of embolium and apex of cuneus, in part or wholly dull to bright red; embolium, basal half of corium and cuneus except tip, translucent yellow; apical half of membrane dusky, cells usually paler, veins brownish; legs and under surface pale straw-yellow, more or less reddish, femora with vague minute brown dots, tarsi in part fuscous. Joint 1 of antennæ reddish-brown, as long as head and neck united; 2 reddish-yellow, darker towards apex, more than twice as long as 1; 3 and 4 fuscous-brown, 3 two-thirds the length of 2, 4 one-half as long as 3. Eyes large, brown, placed in front of middle of head. Calli confluent, strongly convex, impressions before and behind them deep; basal portion of pronotum shorter than calli and collar united, minutely shagreened. Elytra minutely pubescent. Length, 4.5—5 mm.

Lake, Marion and Crawford counties, Ind., May 1—Sept. 28 (*W. S. B.*). Swept from herbage in and along the margins of dense woodland. Mineral Springs, Ind., Sept. 4 (*Gerhard*). Sunburst and Grandfather Mountain, N. Car., May—September (*Brimley*). The known range extends from Ontario and New England west to Michigan and Indiana and southwest to North Carolina. Knight records its food as *Rubus odoratus* L. Varies much in the extent of the red markings, these in some individuals covering the entire corium, in others sometimes wholly lacking.

1011 (1110). *DICYPHUS VESTITUS* Uhler, 1895, 46.

Elongate, slender, sides parallel. Vertex and tylus black, highly polished; upper surface of neck pale yellow, with narrow median line brown; pronotum dull yellow, collar paler, flanks black; mesoscutum black, the dark hue shining through the translucent basal lobe of pronotum; scutellum black, a small yellow spot on each basal angle; elytra straw-yellow, clavus tinged in vague streaks with brown; corium with a faint brown spot opposite apex of commissure and a small distinct one on inner apical angle; embolium and cuneus pale yellow, their extreme tips brown; membrane pale brown, the veins darker; legs pale yellow, femora with minute dark dots, tips of tarsi darker; mesosterna and sides of ventrals shining brown, remainder of under surface usually straw-yellow. Neck behind eyes shorter than width of vertex; eyes large, prominent. Antennæ relatively long and slender, fuscous-black; joint 1 paler at base, twice as long as width of vertex, 2 nearly three times as long as 1, 3 four-fifths the length of 2, 4 two-fifths as long as 3. Pronotum much as in *famelicus*, nearly twice as wide at base as long, hind

lobe shorter than calli and collar united, very minutely and sparsely punctate. Elytra subglabrous, tip of cuneus surpassing apex of abdomen in both sexes. Length, 4.5—5 mm.

Marion, Putnam and Knox counties, Ind., May 8—Oct. 26. Common locally on herbage in low wods along the banks of streams and swept by hundreds, Sept. 5, from water leaf, *Hydrophyllum canadense* L., in dense upland woods. Willow Springs, Ill., July 16 (*Gerhard*). Recorded from New England and New York, west to Colorado, British Columbia and California. Drake (1923, 77) swept it in July and August from ferns growing in shady places near Cranberry Lake, N. Y. According to Van Duzee (Ms.) the *D. gracilentus* Parsh. (1923b, 21) is a synonym.

1012 (—). DICYPHUS DISCREPANS Knight, 1923, 477.

Elongate, slightly widened behind, robust for the genus. Head dark brown, tylus and vertex dull yellow, darker along median line; pronotum dull yellow, the flanks blackish; mesoscutum and scutellum black, opaque, each with a pale spot at sides; clavus and corium straw-yellow, the former heavily tinged with fuscous, the latter with a vague median cross-bar extending across embolium and a spot on inner apical angle fuscous; cuneus pale yellow, its tip and that of embolium piceous; membrane dusky translucent, with pale markings across middle, veins darker; legs dull yellow, femora with minute brown dots, tarsi in great part fuscous; under surface dark brown, shining, ventrals rather thickly clothed with yellow inclined hairs. Joint 1 of antennæ, reddish-yellow, darker at base and apex, two-thirds longer than width of vertex; 2 yellow with apex blackish, two and two-third times longer than 1; 3 fuscous, paler at base, three-fourths as long as 2; 4 fuscous, one-half the length of 3. Neck behind eyes stout, as long as calli. Pronotum with transverse impressions deep, calli confluent, collar shorter than calli, the two united longer than middle of hind lobe, disk of latter minutely shagreened. Clavus, corium and femora minutely and sparsely punctate, each puncture bearing an inclined yellowish hair; costal margin ciliate with similar hairs. Length, 4—4.5 mm.

Marion Co., Ind., May 23—Sept. 13. Swept from low herbage in dense woodland along the banks of White River. Ranges from New Hampshire and New York west to Minnesota. Food plant, aster. Readily known by the robust form, short thick neck, fuscous markings of elytra, wholly dark under surface and distinct inclined hairs of pronotum and elytra.

III. CYRTOPELTIS Fieber, 1861, 76.

Elongate, subparallel, pubescent species, having the head but slightly exserted, front vertical, eyes very large, broader

than width of vertex, narrowly separated beneath; beak reaching middle coxæ; antennæ rather stout, half the length of body; pronotum trapezoidal, nearly twice as wide at base as long, calli low, without transverse constriction behind them, hind margin shallowly and broadly concave; mesoscutum partly exposed; elytra entire, apex of cuneus passing the tip of abdomen, costal margins parallel. Two species, usually recorded under the generic name *Engytatus* Reut., are known from our territory.

KEY TO EASTERN SPECIES OF CYRTOPELTIS.

- a. Larger, length 4.5—4.7 mm.; femora with rows of small black dots. 1013. VARIANS.
 aa. Smaller, length 3.5—3.8 mm.; femora without black dots. 1014. TENUIS.

1013 (1112). CYRTOPELTIS VARIANS (Distant), 1884, 271.

Pale greenish-yellow rather thickly clothed with long yellowish hairs; antennæ fuscous, the base of joints 1 and 2 black, tips of all the joints pale; elytra with commissure, tips of embolium and cuneus and veins of membrane blackish-fuscous; legs yellow, tibiæ with a black spot near base. Pronotum with base nearly twice as wide as apex, sides feebly concave, humeral angles depressed, slightly prolonged; calli confluent, smooth glabrous, disk behind them finely shallowly punctate, thickly pubescent. Mesoscutum rather widely exposed. Male with tylus black and antennæ longer than in female. Length, 4.5—4.7 mm.

Managua, Nicaragua (*Gerhard*). Described from Guatemala. Recorded from Biscayne Bay, Fla., and Texas. According to Uhler it is: "Widely distributed in the southern states, Mexico and the West Indies. In San Domingo it lives on various kinds of weeds growing on the sides of roads and in neglected gardens." The *Engytatus geniculatus* Reut. (1876, 83) is a synonym, his specific name being preoccupied.

1014 (1115). CYRTOPELTIS TENUIS Reuter, 1895, 139.

Color a nearly uniform pale greenish or straw-yellow, sparsely clothed with very fine prostrate pubescence; collar and embolium paler; calli and mesoscutum a deeper yellow; tips of corium and cuneus brown; membrane pale translucent, the veins slightly darker; tips of beak and tarsi fuscous; knees with a small brown spot. Joint 1 of antennæ as long as width of vertex, black at middle, its base and apex yellow; 2 nearly as stout and three and one-half times longer than 1, yellow, its base black, apex fuscous; 3 and 4 dusky yellow, 3 three-fourths as long as 2, 4 one-half as long as 3. Pronotum with sides straight, disk behind calli finely transversely rugose, minutely punctate. Mesoscutum slightly exposed. Length, 3.5—3.8 mm.

Dunedin and Moore Haven, Fla., March 7—27; swept from herbage in low mucky grounds. Recorded from Ft. Myers, Fla. A neotropical species of wide distribution.

IV. MACROLOPHUS Fieber, 1858, 326.

Elongate, subparallel species having the head porrect, its front declivent, eyes small, neck behind them short and wide; antennæ half the length of body, joint 1 stoutest, 3 and 4 more slender than 2; pronotum trapezoidal, about one and three-fourth times wider at base than long, disk with a narrow median longitudinal groove, also a vague transverse one behind calli, hind margin broadly, rather deeply concave; elytra entire, surpassing abdomen, clavus almost flat, cuneus horizontal; joint 2 of hind tarsi longer than 3. Two species occur in our territory.

KEY TO EASTERN SPECIES OF MACROLOPHUS.

- a. Joint 1 of antennæ wholly black; joint 2, two and one-third times the length of 1. 1015. SEPARATUS.
- aa. Joint 1 of antennæ yellow with apex and base fuscous; joint 2, three times as long as 1. 1016. TENUICORNIS.

1015 (1116). *MACROLOPHUS SEPARATUS* (Uhler), 1894a, 194.

Dull straw-yellow; apex of scutellum fuscous; elytra dirty white or pale yellow, thickly flecked with brownish dots or punctures, each bearing a short inclined blackish hair; embolium with a rounded spot near apex and extreme tip dark brown; cuneus pale yellow, its tip brown; membrane dusky, marbled with pale, veins brown; legs and under surface straw-yellow, rather thickly pubescent, tarsi and ventrals tinged with fuscous. Joint 1 of antennæ black, pale at extreme base, one-half longer than width of vertex; 2 dusky yellow, blackish at tip, two and one-third times longer than 1; 3 one-third longer than 2; 4 fuscous, one-fourth the length of 3. Beak reaching hind coxæ. Other characters as under generic heading. Length, 4—4.5 mm.

Hessville, Lake Co., Ind., Sept. 22 (*Gerhard*). Ranges from Ontario and New England west to the Pacific and southwest to Florida, Texas, New Mexico and the West Indies, some of the records doubtless belonging to the next species. Recorded from Ft. Myers, Fla.

1016 (—). *MACROLOPHUS TENUICORNIS* sp. nov.

More slender than *separatus*. Color much the same, head with a narrow black stripe behind each eye; front femora more yellow, their basal halves pale whitish translucent. Antennæ much longer and distinctly more slender, joint 1 yellow, the extreme tip and base blackish, more than twice as long as width of vertex, nearly two-thirds longer than in *separatus*; 2 yellow, the tip black, much more slender and distinctly longer than in *separatus*; 3 and 4 yellow, 3 as long as 2, 4 one-fourth the

length of 3. Elytra with numerous black seta-bearing punctures. Legs, especially the tibiæ, long and slender, hind tibiæ one-third longer than in *separatus*, more thickly beset with longer black spinules. Length, 4.2 mm.

Crawford Co., Ind., Aug. 1. Swept from low herbage along the banks of Blue River.

Subfamily IX. **PHYLINÆ** Reuter, 1910, 111.

Species of variable form and size, but agreeing in having the loræ narrow but very distinct, the impressed line above and below them deep; first joint of antennæ usually short; pronotum without a subapical constriction, sometimes flattened above near apex; inner wings usually with a distinct hamus; joint 3 of tarsi linear, longer than joint 1; arolia wanting, or if present very obscure and bristle-like; pseudarolia usually present, sometimes very large. "Male genitalia distinctive, the tip of penis twisting to the left, lying closely within bend of left clasper, extending downward and beyond it to the left side." (*Knight*).

For convenience of treatment the subfamily is divided into three tribes, separated as follows:

KEY TO TRIBES OF SUBFAMILY PHYLINÆ.

- a.* Pronotum with a more or less flattened apical collar, but without a constriction behind it; abdomen usually distinctly constricted at base; form generally elongate. **Tribe I. HALLODAPINI**, p. 914.
- aa.* Pronotum not flattened near apex, without the semblance of a collar; abdomen not constricted at base.
 - b.* Prosternal xyphus depressed on its disk, its margins more or less elevated; pseudarolia prominent, united with the claws along their full length and sometimes projecting beyond them (pl. X, fig. 13), or attached only at basal angles and extending free and parallel with claws to the tips (pl. X, fig. 14).
Tribe II. ONCOTYLINI, p. 918.
 - bb.* Prosternal xyphus convex, not distinctly margined; pseudarolia minute or wanting, when present attached to the inner basal angle of claw, never extending beyond tip of claws (pl. X, figs. 1—12).
Tribe III. PHYLINI, p. 921.

Tribe I. HALLODAPINI Van Duzee, 1916a, 204, 210.

To this tribe, as characterized above, belong three of our eastern genera.

KEY TO EASTERN GENERA OF HALLODAPINI.

- a.* Pseudarolia connate with claws (pl. X, figs. 15, 16); elytra present in both sexes.

- b. Second antennal strongly abruptly clavate, its thickness at apex twice or more that at base; elytra surpassing abdomen in both sexes. I. TELEORHINUS, p. 915.
- bb. Second antennal nearly linear, slightly thickened toward apex; females brachypterous, ant-like in form. II. ORECTODERUS, p. 916.
- aa. Pseudarolia attached at base of claw, free apically, but extending practically parallel with claw (pl. X, fig. 17); second antennal linear; females apterous, ant-like in form.

III. COQUILLETIA, p. 917.

I. TELEORHINUS Uhler, 1890, 74.

Subfusiform, broadest behind middle. Head triangular, subconical, declivent, but slightly wider across eyes than apex of pronotum, inserted in thorax to eyes; beak almost reaching hind coxæ; pronotum subconical, its apex truncate, sides rounded, feebly concave, calli very low, separated by a wide shallow impression, hind margin straight; mesoscutum widely exposed; scutellum smooth, longer than wide, its tip acute; elytra entire, dilated behind, surpassing abdomen. Two species occur in the eastern states, and a third in California.

KEY TO EASTERN SPECIES OF TELEORHINUS.

- a. Joints 3 and 4 of antennæ united equal in length to 2; color steel blue. 1017. FLORIDANUS.
- aa. Joints 3 and 4 of antennæ united slightly longer than joint 2; color black. 1018. TEPHROSICOLA.

1017 (—). TELEORHINUS FLORIDANUS Knight Ms.

Head black; pronotum, scutellum and elytra steel-blue, all strongly shining; membrane dusky translucent, veins slightly darker; coxæ and femora bright orange-yellow, tibiæ dull greenish-yellow, their tips and joints 1 and 3 of tarsi fuscous; under surface dark brown to black, strongly shining. Joint 1 of antennæ shining black, three-fourths as long as width of vertex; 2 about four times as long as 1, its basal half slender, yellow, apical half black, twice or more as thick as 1, finely and densely pubescent; 3 and 4 dull yellow to fuscous, 4 three-fifths as long as 3. Pronotum with front portion smooth, basal half or more transversely rugose with vague shallow punctures between the rugæ. Clavus coarsely transversely rugose, corium more finely so, both with shallow punctures between the rugæ; apex of membrane broadly rounded. Length, 7—7.2 mm.

Dunedin, Fla., March 31—April 24; three specimens swept from Ericads along the bay front.

1018 (—). TELEORHINUS TEPHROSICOLA Knight, 1923, 476.

Black, shining, minutely pubescent; legs pale reddish-yellow, coxæ whitish, black at base; beak brownish, darker at base and apex. Joint 1 of antennæ black, three-fourths as long as width of vertex, 2 yellowish,

apical two-fifths black, five and three-fourth times as long as 1, its clavate portion twice as thick as 1; 3 and 4 fuscous, 3 two-thirds as long as 1, 4 nearly three-fourths the length of 3. Length, 7.3—7.6 mm.

Known only from Yaphank, Long Island, N. Y., and Lakehurst, N. J., where it was taken by Davis in June and July on flowers of the common goat's rue, *Cracca virginiana* L.

II. ORECTODERUS Uhler, 1876, 319.

Male—Elongate, slender, subparallel with head triangular, feebly declivent, wider across eyes than front margin of pronotum; eyes large, slightly distant from pronotum; vertex broad, subdepressed; beak reaching middle coxæ; pronotum subcampanulate, flattened above near apex; basal half of meso-scutum exposed; scutellum triangular, its apex acute; elytra entire, slightly wider behind middle; cuneus long and narrow, surpassing tip of abdomen. *Female*—Ant-like in form; head shorter, not exserted, much broader than in male, its front subvertical; elytra dimorphic, often much shorter than abdomen, the tips tapering to a point and vertical; base of abdomen strongly constricted into a pedicel, remaining segments forming a subglobose portion. Two species are known, one occurring in our territory.

1019 (1101). ORECTODERUS OBLIQUUS Uhler, 1876, 320.

Male—Black, shining; elytra brownish with basal half of corium and a large spot on base of cuneus dull yellow; membrane smoky-brown, veins darker; legs reddish-brown, front coxæ and tarsi usually in part darker; middle and hind coxæ paler; under surface shining black. Antennæ dull yellow to dark brown, joint 1 paler, as long as width of vertex, 2 as long as inner margin of clavus, gradually feebly thickened from base to apex, 3 much more slender, two-thirds the length of 2, 4 two-thirds as long as 3. Scutellum and basal half of pronotum very finely, transversely rugose, clavus more coarsely rugose, both it and corium minutely and sparsely punctate, each puncture bearing a very fine, short yellowish hair. Length, 7.2—7.8 mm. *Female*—Piceous to black, subopaque; scutellum in part or wholly pale dull yellow; corium and cuneus without pale markings; antennæ brownish to fuscous, joint 4 and tips of 2 and 3 blackish. Length, 5.8—6 mm.

Mt. McClellan, Colo., July 30 (*Gerhard*). Ranges from Ontario and New England west to Manitoba, the Dakotas, Colorado and Kansas. Not recorded south of New Jersey. Occurs in the west on the common sagebush, *Artemisia tridentata* Nutt. Knight (1923, 475) has described a variety *ferruginous* from

Long Island, N. Y., based on some "ferrugino-testaceous" females which were taken in company with a reddish-colored ant (*Camponotus castaneus* Latr.) which the bug resembles very closely. Uhler stated (loc. cit.) that "immature forms of *obliquus* are chestnut-brown, with the white markings less distinct."

III. COQUILLETIA Uhler, 1890, 78.

Male.—Elongate-oval, subopaque. Head long, narrow, its front almost vertical, vertex between eyes wider than apex of pronotum, its base not carinate, constricted to form a short neck; eyes large, oval, prominent, set obliquely; face below the eyes narrow, compressed, acutely subconical; beak reaching middle coxæ; pronotum short, campanulate, front lobe narrow, calli prominent, limited behind by a broad impression, hind lobe convex, basal angles rounded, hind margin subtruncate, leaving mesoscutum broadly exposed; scutellum wide, triangular, convex, elevated above clavus, separated from mesoscutum by a deep, transverse impression; elytra very long, membrane almost as long and nearly twice as wide as corium, costal margin visibly but very broadly concave, feebly reflexed; abdomen strongly constricted near base. *Female*.—Ant-like in form. Head strongly declivent, wider in front of eyes than pronotum, area behind eyes as long as width of vertex; pronotum subquadrate, convex; meso- and metanota wholly exposed, their side margins slightly elevated, feebly carinated, elytra wanting; segments 1 and 2 of abdomen strongly constricted to form a pedicel, their pleuræ slightly elevated and carinate; remaining segments

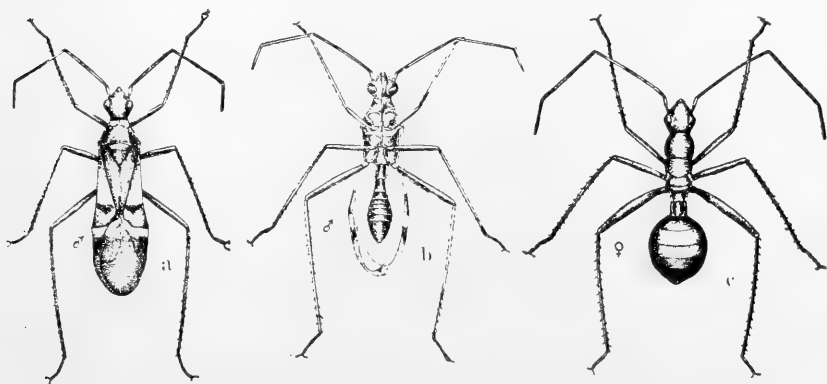


Fig. 188. *Coquillettia mimetica* Osb.: *a* and *b*, dorsal and ventral views of male; *c*, dorsal view of female, X $4\frac{1}{2}$. (After Osborn).

strongly inflated to form a globose terminal portion (fig. 188, c) with conspicuous pleural fold.

Six species have been described from North America, one of which occurs in the eastern states.

1020 (1104). *COQUILLETIA MIMETICA* Osborn, 1898, 236.

Male—Head, front lobe of pronotum, scutellum, clavus and apical half of corium pale reddish-brown, shining; basal half of corium and basal third of cuneus whitish translucent; basal half of pronotum and cuneus, except base, fuscous-brown; membrane uniformly fuscous; femora pale reddish-brown; tarsi and apical halves of tibiæ, fuscous-brown; sterna and ventrals 1—4 brownish-yellow, hind margin of second ventral whitish; genital and ventrals 5 and 6 piceous, shining. Joint 1 of antennæ reddish-brown, 2—4 fuscous-brown; 1 subequal in length to width of interocular area; 2 and 3 subequal, each four times the length of 1, 4 one-third as long as 3. *Female*—Reddish-brown, shining; antennals 3 and 4 and apex of 2, tarsi and apical third of tibiæ dark fuscous-brown; second dorsal and globose portion of abdomen dark chestnut-brown, finely pubescent; osteolar peritreme and hind margin of first and second ventrals whitish. Structural characters as under genus heading. Length, male, 6.2—6.5 mm.; female, 5—5.5 mm. (Fig. 188).

Ames, Iowa, Aug. 29—Sept. 9, types (*Osborn*). Recorded from Jacksonville, Crescent City and Sanford, Fla. Ranges from Ohio west to Iowa and south to North Carolina, Florida and Arizona. "Occurs on elevated grassy ridges, and probably feeds on some of the grasses." (*Osborn*).

Tribe II. *ONCOTYLINI* Douglas & Scott, 1865, 32.

To this tribe, as characterized in the key, p. 914, belong three of our eastern genera of *Phylinae*.⁹²

KEY TO GENERA OF TRIBE *ONCOTYLINI*.

- a.* Pseudarolia attached only at basal angles of claws, the free portion extending parallel with them to tips; claws short, strongly incurved (pl. X, fig. 14); apex of elytra in our species with six pale spots. I. *MACROTYLUS*, p. 919.
- aa.* Pseudarolia connate, with claws for their full length; claws broadly curved (pl. X, fig. 13); apex of elytra without pale spots.
 - b.* Beak not passing beyond hind coxæ; pseudarolia long, extending beyond tip of claws; mesoscutum broadly exposed. II. *LOPUS*, p. 920.
 - bb.* Beak reaching or surpassing third ventral; pseudarolia not reaching apex of claw; extreme tips of claws sharply incurved. III. *MEGALOCOLEUS*, p. 920.

⁹²The North American records of the European *Oncotylus punctipes* Reut. are stated by Knight (1921, 281) to be based on another European species, *Plagiognathus chrysanthemi* (Wolff).

I. MACROTYLUS Fieber, 1858, 325.

Elongate, pubescent species having the head feebly exserted, its front subvertical; tylus prominent, viewed from the side strongly curved; beak reaching hind coxæ, its first joint slightly surpassing base of head; antennæ slender, about half the length of body; pronotum trapezoidal, its sides straight with margins carinate, hind margin straight; mesoscutum narrowly exposed; elytra entire, surpassing abdomen, sides subparallel; legs long, slender, tibiæ finely spinulose. Two of the ten known American species occur in the eastern states. For a monograph of the genus see Van Duzee, 1916c.

KEY TO EASTERN SPECIES OF MACROTYLUS.

- a. Color fuscous-black; head dull greenish-yellow; basal spot of cuneus sometimes yellow; length, 3 mm. 1021. SEX-GUTTATUS.
- aa. Color pale greenish-yellow; membrane and a bar on middle of cuneus blackish, strongly contrasting with the pale spots; length, 2—2.4 mm. 1022. AMÆNUS.

1021 (1200). *MACROTYLUS SEX-GUTTATUS* (Provancher), 1887, 150.

Fuscous-black, opaque; upper surface rather thickly clothed with short blackish hairs; head green or greenish-yellow, shining; cuneus with a large oval yellowish or white translucent spot at base, the apex also white; membrane with a large whitish-hyaline spot each side of apex; legs fuscous-black, apical half of tibiæ and middle of tarsi pale brownish-yellow. Joint 1 of antennæ black, reaching tip of tylus; 2 fuscous-black, apical fourth dull yellow, three and a half times as long as 1; 3 and 4 dusky, 3 two-thirds the length of 2, twice as long as 4. Elytra surpassing abdomen by three-fourths the length of membrane. Length, 3—3.2 mm. (Fig. 167, b).

Ottawa, Ontario, June 30 (*Van Duzee*). Cook Co., Minn., Aug. 14 (*Minn. Univ. Coll.*). Recorded from Quebec, Ontario, New England and New York. Breeds on *Aster*.

1022 (1201). *MACROTYLUS AMÆNUS* Reuter, 1909, 75.

Dull greenish-yellow; inner basal angle and apical half of cuneus and a spot on sides of apical third of membrane, ivory-white; an oblique bar across middle of cuneus velvety-black; membrane, except pale spot on sides, dark brown; femora dull yellow, the upper edge with a black stripe; tibiæ and tarsi fuscous or black; under surface dull yellow, the genital region dark brown, shining. Antennæ fuscous, the incisures pale, joint 2 as long as width of basal margin of pronotum. Pronotum twice as wide at base as long; width of apex subequal to length of middle of disk. Length, 2—2.5 mm.

Swannanoa, N. Car., June 20 (*Brimley*). Described from Connecticut. Recorded elsewhere only from Massachusetts, Pennsylvania and Estero, Fla.

II. LOPUS Hahn, 1833, 143.

Elongate, slender, subparallel, finely pubescent species having the head as broad across eyes as long, its front declivent; tylus convex, forming a continuous curve; beak reaching hind coxæ; pronotum trapezoidal, twice as wide at base as long, sides straight, hind margin straight at middle, rounded on sides, disk convex, declivent towards head; scutellum triangular, equilateral, on a higher plane than clavus; elytra entire, surpassing abdomen; clavus convex, deflected to corium; cuneus and membrane deflected; tarsi short, joints 2 and 3 subequal, 1 two-thirds the length of 2. One introduced European species occurs in the eastern states.

1023 (1207). LOPUS DECOLOR (Fallen), 1807, 102.

Female—Pale greenish- or straw-yellow, the elytra subhyaline; basal lobe of pronotum with three short fuscous stripes; scutellum whitish; clavus and inner half of corium slightly tinged with fuscous; membrane pale translucent, feebly iridescent; legs pale yellow, tarsi, claws and apical half of beak piceous; under surface dull yellow, sides of ventrals with vague fuscous spots. Joints 1 and 2 of antennæ dull yellow, apex of 1 and base of 2 usually darker; 1 two-thirds as long as width of vertex; 2 feebly thickened toward apex, four times as long as 1; 3 and 4 fuscous, filiform, 3 two-thirds as long as 2, 4 one-half the length of 3. Calli small, convex, rather prominent, widely separated. Length, 3.8—4 mm. *Male*—Larger and darker. Second antennal as long as width of vertex. Head with brown markings; calli usually blackish; elytra and corium more heavily tinged with fuscous; under surface black. Length, 4.5—4.8 mm.

Staten Island, N. Y., July 17 (*Davis*). Recorded in this country from Quebec, Ontario and the eastern seaboard states, as far south as Maryland; also from California. "Breeds on sedges; found in numbers and observed to oviposit in the stem of *Juncus dudleyi* Wieg. at McLean, N. Y." (*Knicht*).

IV. MEGALOCOLEUS Reuter, 1890a, 254.

Differs from the other genera of the tribe mainly by the characters given in the generic key. One introduced European species has been taken in Massachusetts.

1024 (—). MEGALOCOLEUS MOLLICULUS (Fallen), 1829, 82.

Elongate, sides subparallel, male; suboval, female. Greenish-yellow or grayish-green, thickly clothed with conspicuous suberect dusky hairs;

clavus and corium often more or less tinged with brownish, the latter sometimes with an irregular transverse pale brown band across apical third; cuneus brownish, its base pale; membrane dusky, iridescent, the smaller cell and a spot near tip of cuneus blackish, veins yellowish; legs pale yellow, femora with a row of minute brown spots on lower face, apical half flecked above with brown. Antennæ yellowish or yellowish-brown, sparsely clothed with short stiff black hairs, joint 1 two-thirds as long as width of vertex; 2 three and one-half times as long as 1; 3 and 4 subfiliform, 3 two-thirds the length of 2, 4 one-third as long as 3. Length, 4.5—5.2 mm.

Deal and Chiltern Hills, England, August (*British Mus. Coll.*). Known in this country only from Massachusetts. Occurs in England on tansy, *Tanacetum vulgare* L., and yarrow, *Achillea millefolium* L.

Tribe III. PHYLINI Van Duzee, 1916a, 204.

This tribe, as characterized in the key, p. 914, contains the great majority of our eastern species of the subfamily Phylinae, the tribe being represented in the eastern states by 16 genera. For convenience of treatment these are separated into two groups or subtribes.

KEY TO SUBTRIBES OF TRIBE PHYLINI.

- a. Pubescence, when present, composed of a single type of fine, sub-erect or prostrate hairs; upper surface sometimes nearly glabrous.
SUBTRIBE I, p. 921.
- aa. Pubescence composed of closely appressed tomentose or scale-like deciduous hairs, usually intermixed with more erect ones.
SUBTRIBE II, p. 949.

:SUBTRIBE I.—PHYLINI.

KEY TO GENERA OF SUBTRIBE I, PHYLINI.

- a. Second antennal distinctly longer than width of head across eyes; front of head more or less produced, the facial angle, when viewed from the side (the angle between the lower margin of bucculæ and tylus) less than a right angle.
- b. Vertex without an impression each side near eye; joint 3 of hind tarsi usually slightly shorter than 2.
- c. Tibiæ pale, their spines usually dark but without black spot at base.
- d. Joint 2 of antennæ slender, distinctly thinner than joint 1; tylus flat, confluent with front; upper surface chiefly brown or blackish, sometimes in part pale.
- e. Joint 1 of antennæ not or scarcely passing tip of tylus; spines of tibiæ pale.
I. STHENARUS, p. 922.
- ee. Joint 1 of antennæ distinctly passing tip of tylus; spines of tibiæ black without spots at base. II. MICROPHYLELLUS, p. 923.

dd. Joint 2 of antennæ swollen, its apex at least equal in thickness to joint 1; color chiefly reddish, elytra and ventrals usually in part fuscous. III. RHINOCAPSUS, p. 925.

cc. Tibiæ chiefly pale, their spines with a black spot at base, or if not, then the upper surface and tibial spines also pale.

IV. PLAGIOGNATHUS, p. 927.

bb. Vertex with an impression each side near margin of eye; joints 2 and 3 of hind tarsi subequal. V. MICROSYNAMMA, p. 945.

aa. Second antennal not or but slightly longer than width of head across eyes; head not or scarcely produced, the facial angle forming a right angle.

f. Second antennal linear or nearly so, never thicker than first one; hind tarsi less than one-third the length of tibiæ.

g. Small black species; hind femora black; head broad, about one-fifth narrower than hind margin of pronotum; pseudarolia connate with claws to their tips or nearly so (pl. X, fig. 1).

VI. CHLAMYDATUS, p. 946.

gg. Small pale to yellowish species; legs pale, hind femora dotted with black; head narrower; first antennal with a black ring; pseudarolia minute, not extending beyond middle of claw (pl. X, fig. 9).

VII. CAMPYLOMMA, p. 948.

ff. Second antennal strongly thickened and flattened, male, distinctly thickened toward apex, female; hind tarsi nearly half the length of tibiæ.

VIII. LEUCOPCECILA, p. 948.

I. STHENARUS Fieber, 1858, 321.

Small elongate-oval, pubescent species having the head broader across eyes than long, its front strongly deflexed; vertex convex, carinate at base; pronotum short, subtrapezoidal, twice as broad across base as long, hind margin truncate, hind angles rounded, calli subobsolete; mesoscutum concealed; elytra entire, surpassing abdomen, cuneus subhorizontal; beak reaching first ventral. One of the three known North American species occurs in Florida.

1025 (—). STHENARUS PLEBEJUS Reuter, 1907b, 26.

Head, pronotum and scutellum fuscous-black; elytra and humeral angles of pronotum dull brownish-yellow to fuscous-brown, cuneus concolorous; membrane dusky-hyaline, the apical half iridescent and minutely rugose; legs pale straw-yellow, tarsi and apical third of tibiæ tinged with fuscous; under surface dark fuscous-brown tinged with reddish, middle of ventrals paler. Joint 1 of antennæ straw-yellow, two-fifths as long as width of vertex; 2 reddish-yellow, darker at tip, its apical half slightly thickened, four and one-third times as long as 1; 3 and 4 dusky, subequal in length, united two-thirds as long as 2. Upper surface sparsely clothed with long fine yellowish hairs. Front half of pronotum smooth; hind one finely transversely rugose. Scutellum and elytra similarly rugose. Length, 2—2.8 mm.

Dunedin, Fla., Nov. 18—Feb. 6 (*H. S. B.*); several swept from low ground herbage. Soledad, Cuba, Feb. 9 (*Knight*). Described from Jamaica; not before recorded from this country.

II. MICROPHYLELLUS Reuter, 1909, 76.

Small elongate- or oblong-oval species having the head strongly declivent, about one-third narrower than base of pronotum; beak reaching to or beyond hind coxæ, its first joint reaching base of head; antennæ slender, joint 1 usually passing tip of tylus; pronotum with base about twice as wide as apex, sides straight, hind lobe convex, declivent forward; mesoscutum rather broadly exposed; elytra entire, membrane 2-celled; legs usually wholly pale, femora often with fuscous dots. Seven species have been recorded from our territory.

KEY TO EASTERN SPECIES OF MICROPHYLELLUS.

- a. Embolium, cuneus and basal half of corium pale or yellowish; scutellum pale with median line blackish; host plant, white oak.
1026. *MACULIPENNIS*.
- aa. Elytra uniformly pale brown to black.
 - b. Joint 2 of antennæ black; joint 1 pale on apical half; host plant, large-leaved aster, *Aster macrophyllus* L. 1027. *NIGRICORNIS*.
 - bb. Joint 2 of antennæ pale, sometimes fuscous at base.
 - c. Second antennal shorter than width of pronotum at base.
 - d. Joint 1 of antennæ yellowish, fuscous only at base; femora usually with fuscous dots; length, 3—3.3 mm.; host plants, elm and white oak. 1028. *MODESTUS*.
 - dd. Joint 1 of antennæ brown or blackish.
 - e. Smaller, length 2.6—2.8 mm.; beak not reaching beyond base of hind coxæ; femora uniformly yellowish; host plant, hemlock. 1029. *TSUGÆ*.
 - ee. Larger, length 3.3 mm.; beak reaching nearly to first ventral; femora with fuscous spots. 1030. *TUMIDIFRONS*.
 - cc. Second antennal as long as or longer than width of pronotum at base.
 - f. Beak reaching to or beyond fourth ventral; hind femora uniformly pale; host plant, hazelnut. 1031. *LONGIROSTRIS*.
 - ff. Beak reaching only to middle of hind coxæ; hind femora with fuscous spots on front face; host plant, sugar maple. 1032. *ELONGATUS*.

1026 (—). *MICROPHYLELLUS MACULIPENNIS* Knight, 1923, 456.

Pale fuscous with paler markings as in key, thickly clothed with fine prostrate yellow pubescence; head blackish, vertex pale; pronotum with middle of disk and basal angles greenish-yellow; mesoscutum blackish; membrane fuscous-hyaline, paler along apical half of cuneus; legs pale

yellow, basal half of hind coxæ and tips of tarsi fuscous; under surface dark brown, shining, minutely pubescent. Joints 1 and 2 of antennæ straw-yellow, fuscous at base; 1 slightly shorter than width of vertex; 2 dusky at apex, nearly three times as long as 1; 3 yellowish tinged with dusky, about three-fifths the length of 2; 4 two-thirds as long as 3. Beak reaching tips of middle coxæ. Length, 3.4—3.6 mm.

St. Anthony Park, Minn., June 10 (*Minn. Univ. Coll.*). Recorded only from New York and Minnesota. A form from Maine with second antennal blackish and femora dotted with fuscous Knight calls var. *fusicornis*.

1027 (—). MICROPHYLELLUS NIGRICORNIS Knight, 1923, 457.

Black, strongly shining, minutely dusky pubescent; membrane and veins uniformly fuscous; legs pale straw-yellow, bases of coxæ and tips of tarsi blackish; ventrals black with yellowish and black pubescence. Antennæ pale yellowish, joint 2 and base of 1 black; 1 three-fourths as long as width of vertex, 2 nearly four times as long as 1, 3 one-fourth shorter than 2, nearly twice as long as 4. Length, 3.8—4 mm.

Ithaca, N. Y., July 7 (*Minn. Univ. Coll.*). Recorded elsewhere only from Parry Sound, Ontario, and Batavia, N. Y.

1028 (1225). MICROPHYLELLUS MODESTUS Reuter, 1912a, 62.

Color a nearly uniform brown to blackish; rather thickly clothed with fine inclined yellowish hairs; membrane fuscous-translucent, feebly iridescent, veins slightly paler; beak, legs and antennæ pale yellow; femora usually with a row of small vague fuscous dots along the upper side of outer face; tips of tibiæ and tarsi blackish. Joint 1 of antennæ scarcely half as long as width of vertex, 2 about four times longer than 1, slightly shorter than width of pronotum at base, 3 and 4 united, about as long as 2. Beak reaching hind coxæ. Length, 3—3.3 mm.

Marion, Knox and Posey counties, Ind., June 4—26; beaten from elm and swept from low herbage (*W. S. B.*). Mill Brook, N. Car., May 11—13 (*Brimley*). The known range extends from Ontario and New England west to Indiana and southwest to North Carolina. "Found most frequently among aphid curled leaves of elm and white oak, feeding to some extent on honey dew, but sometimes on eggs of the elm leaf beetle, *Galerucella luteola* Mull." (*Knight*).

1029 (—). MICROPHYLELLUS TSUGÆ Knight, 1923, 456.

Dark brown thinly clothed with pale yellowish pubescence; elytra feebly translucent, membrane uniformly brownish-hyaline, iridescent; legs yellowish, bases of coxæ and tips of tarsi fuscous; ventrals dark brown. Joint 1 of antennæ fuscous-black, three-fifths as long as width of vertex; 2 yellowish, fuscous at base, nearly four times as long as 1; 3 dull yellow, three-fifths the length of 2; 4 dusky, two-thirds as long as 3. Length, 2.6—2.8 mm.

Tompkins County, N. Y., July 3 (*Minn. Univ. Coll.*). Known only from that State.

1030 (—). *MICROPHYLELLUS TUMIDIFRONS* Knight, 1923, 455.

Black, moderately shining, clothed with pale pubescence; elytra feebly translucent; membrane and veins wholly pale fuscous; legs yellow, coxæ black, femora with two rows of pale fuscous spots, third tarsal fuscous; ventrals black, dusky pubescent. Joint 1 of antennæ black, slightly more than half as long as width of vertex; 2 yellow, dusky pubescent, four times as long as 1; 3 yellow, two-thirds the length of 2; 4 dusky yellow, one-fourth shorter than 3. Front of head distinctly swollen. Pronotum with an evident but slight impression in front of calli. Length, 3.3 mm.

Recorded only from Truro, Nova Scotia. Host plant unknown.

1031 (—). *MICROPHYLELLUS LONGIROSTRIS* Knight, 1923, 458.

Color above and below dark brown to black, shining, very sparsely clothed with minute dusky hairs; membrane and veins uniform dark fuscous-brown; legs pale yellow without dots; tarsi tinged with dusky. Antennæ yellow, joints 3 and 4 slightly darker; joint 1 slightly shorter than width of vertex, 2 four and a third times longer than 1, 3 nearly three-fourths the length of 2, 4 one-half as long as 3. Pronotum nearly twice as wide at base as long at middle, both it and elytra minutely granulate, without visible punctures. Length, 3.4—3.8 mm.

New Haven, Conn., July 7 (*Walden*). Willow Springs, Ill., June 7 (*Gerhard*). The known range extends from New England west to Illinois and Minnesota, mostly north of latitude 40°.

1032 (—). *MICROPHYLELLUS ELONGATUS* Knight, 1923, 458.

Black, shining, clothed with dusky pubescence; membrane and veins uniformly fuscous; legs straw-yellow, hind and middle coxæ and tips of tarsi blackish; ventrals black, shining. Antennæ yellowish, joints 1 and 2 darker at base, 1 four-fifths as long as width of vertex, 2 four and one-fourth times the length of 1, 3 two-thirds as long as 2, 4 two-fifths the length of 3. Length, 3.8—4 mm.

Recorded only from Batavia, N. Y.

III. RHINOCAPSUS Uhler, 1890, 81.

Elongate-oval shining species having the head declivent, wider across eyes than apex of pronotum; vertex subquad-rangular, transverse, slightly convex; tylus long, prominent, curved; antennæ stout, joint 1 shorter than head, 2 subfusiform, as long as vertex and pronotum united, 3 and 4 abruptly setaceous, united much shorter than 2; pronotum trapezoidal,

sides strongly declivent, their margins distinct, hind margin feebly concave; mesoscutum broadly exposed; scutellum short, flat, its apex acute; elytra entire, costal margin broadly regularly curved throughout its length; apical half of clavus acutely narrowed to tip; outer margin of cuneus incurved at base forming a notch; legs stout, hind femora with rows of dots; joint 1 of hind tarsi very short, 2 and 3 subequal. Three species occur in the eastern states.

KEY TO EASTERN SPECIES OF RHINOCAPSUS.

- a.* Second antennal black apically, its basal third or more reddish-yellow. 1033. VANDUZEEI.
- aa.* Second antennal uniformly dark reddish-brown or black.
 - b.* Joint 2 of antennæ not longer than width of pronotum at base; larger, length 4.3—5 mm. 1034. RUBRICANS.
 - bb.* Joint 2 of antennæ distinctly longer than width of pronotum at base; smaller, length 3.4 mm. 1035. MINIATUS.

1033 (1228). RHINOCAPSUS VANDUZEEI Uhler, 1890, 82.

Head, pronotum, scutellum and sterna in great part red, tylus, cheeks and loræ black; basal half of pronotum and scutellum often tinged with fuscous; elytra and ventrals dark fuscous-brown to black; membrane, including veins, paler fuscous-brown; legs dull yellow, the brown dots on outer face of front and middle femora very small, on hind ones conspicuous. Joint 1 of antennæ yellow, 2 as in key, 3 dusky yellow, 4 fuscous. Pronotum two-thirds wider at base than long, calli low and vaguely defined; disk almost smooth. Length, 3.5—4 mm.

Pentwater, Mich., July 15 (*Gerhard*). Swannanoa, N. Car., July (*Brimley*). The known range extends from Ontario and New England west to Michigan and southwest to North Carolina. Host plant, wild red raspberry, *Rubus strigosus* Michx.

1034 (1226). RHINOCAPSUS RUBRICANS (*Provancher*), 1887, 154.

Head, front portion of pronotum, femora and under surface a clear red; elytra uniform reddish-brown; legs reddish-testaceous; hind femora without black spots, tarsi brown. Antennæ dark brown to blackish; joint 1 slightly passing tip of tylus; 2 wholly black, stouter than 1, longer than the others united. Vertex without a basal margin. Beak reaching hind femora. Pronotum smooth, calli scarcely evident. Length, 4.3—5 mm.

Described from Saint Gertrude, Quebec. Recorded from Maine, Massachusetts and Lake Toxaway, N. Car.

1035 (—). RHINOCAPSUS MINIATUS Knight, 1923, 460.

Color a nearly uniform shining cinnabar red, clavus and corium slightly darker; membrane pale fuscous, feebly iridescent; ventrals slightly tinged with fuscous; legs reddish-yellow without darker dots; tibiæ and tips of tarsi tinged with fuscous. Joint 1 of antennæ red, one-

half shorter than width of vertex; 2 and 3 dusky red, 2 four and a half times longer than 1, 3 three-fifths as long as 2; 4 dusky, one-half as long as 3. Beak reaching middle of hind coxæ. Pronotum twice as wide at base as long, calli indistinct, disk smooth, both it and corium sparsely clothed with very fine prostrate hairs. Length, 3.4 mm.

Lakehurst, N. J., June 27 (*Davis*). This is the type locality, and it is not definitely recorded elsewhere. Uhler, in his notes following the description of *R. vanduzeei* says: "A red variety of this insect, but of smaller size, occurs in Maryland, Virginia, North Carolina and Florida." He probably referred to Knight's *miniatus*. This is the only Florida record of a member of the genus.

IV. PLAGIOGNATHUS Fieber, 1858, 320.

A large genus of small, oval, more or less shining species, the males being usually elongate or oblong, with sides subparallel, the females slightly more robust with margins of embolium feebly curved. They have the head wider across eyes than apex of pronotum, its front strongly declivent or subvertical; tylus narrow, convex; antennæ slender, about half the length of body, joints variable in length as to species, the second always much longer than width of head; beak reaching or surpassing hind coxæ; pronotum trapezoidal, sides of disk strongly declivent, their margins rounded, not carinate, straight or feebly sinuate; calli low but distinct, usually more or less confluent, with an impression between the middle of their bases; hind lobe convex, declivent forward, its hind margin slightly rounded; mesoscutum rather broadly exposed; scutellum triangular, equilateral; elytra entire, surpassing abdomen, clavus deflected to corium, cuneus deflexed, the base of its outer margin incurved to form a slight notch; legs usually in great part pale with femora more or less mottled or dotted with brown or fuscous; tibial spines (except in Group A) with a black spot at base; joint 2 of hind tarsi longer than 3. Thirty-five species and numerous varieties are known from the eastern states. For convenience of study these are separated into three groups.

KEY TO GROUPS OF EASTERN SPECIES OF PLAGIOGNATHUS.

- a.* Tibial spines yellowish or pale brown without distinct black spots at base; general color pale greenish-yellow. GROUP A, p. 928.
- aa.* Tibial spines dark with a black spot at base of each spine, the spots sometimes wanting toward apex of tibiæ.

- b. Joint 2 of antennæ dark fuscous to black, sometimes slightly paler at middle, but always more black than pale. GROUP B, p. 929.
 bb. Joint 2 of antennæ chiefly pale, blackish only at base. GROUP C, p. 938.

GROUP A.—PLAGIOGNATHUS.

This group comprises only two of our known eastern species.

KEY TO EASTERN SPECIES OF GROUP A. PLAGIOGNATHUS.

- a. First antennal with two black lines, second with one; scutellum pale greenish-yellow; beak reaching middle of hind coxæ. 1036. NIGROLINEATUS.
 aa. First and second antennals without black lines; scutellum fuscous; beak reaching hind margins of middle coxæ. 1037. ILICIS.
 1036 (—). PLAGIOGNATHUS NIGROLINEATUS Knight, 1923, 443.

Pale greenish- or straw-yellow, rather thickly clothed with fine suberect yellowish hairs; membrane pale translucent, usually with a streak on apical half and a spot in smaller cell, fuscous; front and middle femora usually with a short black line on upper face; apical half of hind femora with a black line on inner face and a black dot near middle of outer one; tibiæ dull yellow, with a small black spot just below knees on upper face. Joints 1 and 2 of antennæ with black lines as in key, about four-fifths as long as width of vertex, 2 nearly five times as long as 1, 3 one-half the length of 2, 4 two-fifths as long as 3. Length, 4.1—4.3 mm.

Dunedin, Fla., March 28—April 17. Beaten from foliage of live oak, *Quercus virginiana* Mill., swept from low herbage along the bay front, and taken at porch light. Recorded only from Connecticut and Minnesota. Knight gives its host plant as *Quercus macrocarpa* Michx., and its range is probably coextensive with that tree. Easily known by the uniform pale color and black lines of antennæ and legs.

1037. (—). PLAGIOGNATHUS ILICIS Knight, 1925a, 305.

Head and pronotum greenish-yellow, the latter with front and side margins more greenish and basal half of disk tinged with fuscous; mesoscutum dull yellow; elytra pale yellowish-translucent, clothed with yellowish-brown pubescence; apical halves of clavus, embolium and corium pale fuscous; membrane uniformly pale fuscous-brown; legs straw- yellow, femora marked with small vague fuscous dots; tibiæ pale, spines yellowish-brown without spots at base; under surface greenish-yellow. Joints 1 and 2 of antennæ greenish-yellow, apical half of 2 dusky; 1 but slightly more than half as long as width of vertex, 2 four and three-fourth times the length of 1; 3 and 4 brownish to fuscous, 3 three-fifths as long as 2, 4 three-fifths the length of 3. Female more robust than male, upper surface rather uniformly yellowish; scutellum and a cloud on apical half of corium fuscous-brown. Length, 3.4—3.7 mm.

Recorded only from near Ithaca, N. Y., where it occurred in some numbers in July on the winterberry, *Ilex verticillata* (L.).

GROUP B.—PLAGIOGNATHUS.

To this group belong 18 species and four varieties of our eastern forms of the genus.⁹³

KEY TO EASTERN SPECIES AND VARIETIES OF GROUP B, PLAGIOGNATHUS.

- a. Cuneus in part or wholly black or blackish, never chiefly brown.
- b. Cuneus more or less pale at base.
- c. Scutellum in part pale.
- d. Scutellum black along median line, the lateral margins broadly pale. 1038. *OBSCURUS*.
- dd. Scutellum pale along median line, sometimes pale only at apex, or broadly pale with only the basal angles blackish.
- e. Cuneus pale at base and along outer margin; femora pale to fulvous, hind ones with two rows of distinct brown or blackish spots; length, 4—4.5 mm. 1039. *FLAVOSCUTELLATUS*.
- ee. Cuneus pale at base, but not along outer margin; femora pale to black, usually blackish at base and paler on middle, without rows of dots, sometimes with only the tips pale; length, 3.8—4 mm. 1042a. *POLITUS* var. *FLAVEOLUS*.
- cc. Scutellum uniformly black.
- f. Pronotum pale in front; corium chiefly pale testaceous or ivory white, its apical half with a large suboval fuscous spot; cuneus pale with a small black spot at apex. 1040. *FRATERNUS*.
- ff. Pronotum and elytra black; cuneus with a small pale lunule at base.
- g. Femora black, their tips pale.
- h. Length, 4.7 mm.; beak reaching upon middle coxæ; pubescence yellowish. 1041. *INTRUSUS*.
- hh. Length, 3.5 mm.; beak slightly surpassing hind coxæ; pubescence white. 1042. *POLITUS*.
- gg. Femora yellowish with one or two rows of black spots on front face; pubescence yellowish; length, 4 mm. 1044a. *ANNULATUS* var. *CUNEATUS*.
- bb. Cuneus uniformly black or fuscous like the corium, rarely slightly paler at the fracture.
- i. Beak and legs chiefly yellowish; femora with black lines or spots.
- j. Smaller, not over 3 mm.; femora with a few small blackish spots, but without black lines; elytra uniformly black, cuneus never pale at base. 1043. *REPETITUS*.
- jj. Larger, length 3.8—4.5 mm.
- k. Apical half of hind femora with black spots on front face and a black line on both upper and lower faces.

1044. *ANNULATUS*.

⁹³The *P. mærens* Reut. (1909, 80) is a western species and the Michigan record of Townsend under that name was based on a manuscript name of Uhler, nearly twenty years before Reuter described the species.

- kk.* Apical half of hind femora with two rows of black spots on front face, but without a black line above and below.
1045. *CARINATUS*.
- ii.* Beak and legs black or fuscous; femora without distinct line or spots.
l. Femora, tibiæ and antennæ obscured with fuscous or brownish-black; joint 3 of antennæ dusky to fuscous, scarcely paler than joint 2; elytra brownish-black, somewhat translucent; pubescence yellowish to dusky.
1046. *LARICICOLA*.
- ll.* Femora black, except on extreme tips; tibiæ yellowish, but with prominent black spots.
m. Smaller, length 3 mm.; second antennal shorter than width of head plus width of vertex; color deep black, strongly shining, pubescence white.
1047. *NIGRONITENS*.
- mm.* Larger, length 4.2—4.5 mm.; second antennal longer than width of head plus width of vertex.
n. Beak reaching upon hind coxæ; brownish-black, sometimes slightly translucent at cuneal fracture.
1044b. *ANNULATUS* var. *NIGROFEMORATUS*.
- nn.* Beak not reaching hind coxæ; black, cuneus uniformly black like the corium.
1048. *NIGRITUS*.
- aa.* Cuneus pale or uniformly fulvous to dark brown, sometimes dusky at apex, but never in part distinctly black.
o. Cuneus and whole upper surface chiefly reddish-yellow; scutellum and clavus sometimes slightly darker; tylus and loræ black.
p. Joint 2 of antennæ longer than width of pronotum at base; beak reaching third ventral.
1049. *ROSICOLA*.
- pp.* Joint 2 of antennæ shorter than width of pronotum at base; beak reaching between hind coxæ.
1050. *FULVIDUS*.
- oo.* Cuneus and upper surface not distinctly reddish-yellow; cuneus sometimes of that hue, but the apical half of corium then black.
q. Scutellum uniformly pale or green.
r. Pronotum and elytra nearly uniformly pale greenish- or straw-yellow.
s. Smaller, length 3.4—3.5 mm.; antennæ black, narrow tip of joint 1 alone pale.
1051. *ATRICORNIS*.
- ss.* Larger, length 4.5—4.7 mm.; joints 1 and 2 of antennæ dark brown, 3 and 4 pale fuscous.
1052. *BLATCHLEYI*.
- rr.* Basal half of pronotum, apical half of corium, and disk of clavus fuscous-brown or blackish.
1053. *NUBILUS*.
- qq.* Scutellum fuscous to blackish, or with a blackish median line.
t. Beak not extending beyond middle coxæ; elytra black, basal one-third to one-half of embolium and corium pale; cuneus pale to fulvous, its apex frequently dusky.
1054. *BREVIROSTRIS*.
- tt.* Beak reaching or surpassing middle of hind coxæ.
u. Smaller, length 3.7—4.6 mm.; pale area of corium extending back along the claval suture.
1038a. *OBSCURUS* var. *ALBOCUNEATUS*.

- uu. Larger, length 4.5—4.9 mm.; pale area of corium extending back along the radial vein; females with fuscous area on apical half of corium separated into two elongate spots by backward extension of pale area along radial vein.

1055. ALBORADIALIS.

1038 (1239). *PLAGIOGNATHUS OBSCURUS* Uhler, 1872, 418.

Head, sides of basal half or more of pronotum, middle of scutellum, clavus except outer margin, and a large wedge-shaped spot on apical half of corium, black or fuscous-black; calli and narrow edge of embolium dull yellow; corium with basal third and a ray extending back along claval suture to apex of commissure, dull white; basal two-thirds of cuneus whitish, apical third fuscous, edges yellowish; membrane fuscous, spot near tip of cuneus whitish, veins yellow. Joints 1 and 2 of antennæ black, their incisures paler, 3 and 4 dusky yellow; legs dull yellow, outer apical half of under surface paler on sides; hind femora with a vague bar and two rows of small dots fuscous; tips of beak and tarsi fuscous; ventrals fuscous to blackish, paler on sides. Upper surface rather thickly clothed with conspicuous inclined yellow hairs. Beak reaching first ventral. Length, 4—4.4 mm.

Wilmington, N. Y., July 12 (*Davis*). Ranges from Nova Scotia, Quebec and New England west to Victoria, B. C., Kansas and Colorado. Not recorded in the east south of New Jersey. Uhler states that in Maryland it occurs on flowers of the ox-eye daisy, and when approached attempts to hide beneath the calyx of the flowers.

1039 (—). *PLAGIOGNATHUS FLAVOSCUTELLATUS* Knight, 1923, 440.

Head with vertex and front greenish-yellow; tylus dark brown, shining, cheeks fuscous; pronotum dark brown, its narrow front and side margins and sometimes a vague median spot, greenish-yellow; scutellum as in *dd* of key; clavus and apical half of embolium and corium dark brown to blackish; basal half of corium and embolium, narrow costal margin and base and outer margins of cuneus pale, the pale hue of corium extending farther back along radial vein than along claval suture; membrane a uniform fuscous-brown, the veins paler; legs dull yellow, femora dotted as in key; under surface fuscous-black or brown with yellow pubescence. Joints 1 and 2 of antennæ dark brown; 1 about one-sixth shorter than width of vertex, its extreme tip pale; 2 four and one-half times longer than 1; 3 and 4 fuscous, 3 three-fifths the length of 2, 4 two-fifths as long as 3. Upper surface sparsely clothed with yellow pubescence. Length, 4.2—4.6 mm.

Marion Co., Ind., June 30—July 15. The known range extends from Nova Scotia and New England west to Minnesota, mainly north of latitude 40°. Host plant, the sand-bar willow, *Salix fluviatilis* Nutt.

1040 (1238). *PLAGIOGNATHUS FRATERNUS* Uhler, 1895, 51.

Oblong-oval. Color above in great part black, sparsely clothed with fine yellowish pubescence; vertex greenish-yellow tinged with blackish; front margin, median line and narrow edges of pronotum, basal third of corium and embolium, tips of clavus, anal ridge and basal half of cuneus greenish-yellow; membrane fuscous, a spot near middle and veins pale; femora blackish, paler at tips; tarsi dull yellow, the knees, spines and spots at their bases, black; under surface in great part black, the ventrals in part greenish-yellow. Joints 1 and 2 of antennæ black, 1 about two-thirds as long as width of vertex, 2 three and a half times longer than 1; 3 and 4 dusky yellow, 3 about two-thirds as long as 2, 4 one-half the length of 3. Length, 4.8 mm.

Dillsboro, N. Car., Sept. 12 (*Brimley*). The recorded range extends from New England west to Colorado, north of latitude 40°, the North Carolina specimen, determined by Knight, being the first one known from the south. New Jersey specimens received as *fraternus* from Davis and others so named from North Carolina have the scutellum yellow, and Knight states that: "Judging from a large amount of material from Colorado and the eastern states, *fraternus* Uhler appears to be nothing more than a variety of *obscurus* Uhler."

1041 (—). *PLAGIOGNATHUS INTRUSUS* Knight, 1926, 12.

Color nearly as in *politus*, the pubescence yellowish. Joint 1 of antennæ black, extreme apex pale, its length equal to width of vertex; 2 black, three and three-fifths times the length of 1; 3 yellowish to fuscous, three-fourths as long as 2; 4 fuscous, nearly three-fifths the length of 3. Length, 4.7 mm.

Recorded only from McLean and the Cranberry Lake region, N. Y. Host plant unknown.

1042 (1241). *PLAGIOGNATHUS POLITUS* Uhler, 1895, 52.

Dark shining fuscous-brown to black, sparsely clothed with whitish or yellowish inclined hairs; vertex in great part dull yellow; anal ridges and a narrow curved line along fracture of cuneus dull yellow; membrane fuscous, a vague rounded spot at middle and the veins paler; osteolar duct, tibiæ and tips of coxæ in great part dull yellow, knees and spines of tibiæ black. Joints 1 and 2 of antennæ dark brown to black, 3 and 4 pale fuscous; 1 three-fifths as long as width of vertex, 2 four and a third times longer than 1, 3 two-thirds as long as 2, 4 one-half as long as 3. Pronotum one-half wider at base than long, disk almost smooth, its sides strongly declivent. Clavus and corium very finely transversely rugose. Length, 3.5—4 mm. (Fig. 189).

Occurs throughout Indiana, June 20—Oct. 14; common locally on ragweed, flowers of goldenrod and other Compositæ.

Raleigh, N. Car., Sept. 2 (*Brimley*). Ranges from Quebec and New England west to Manitoba, Colorado and Kansas, and southwest to North Carolina. Recorded also from California. Host plants, ragweed, goldenrod, etc. The *Lygus fuscus* Prov.

(1872, 105) is stated by Van Duzee (1912, 323) to be "very close to if not identical with *P. politus* Uhl." If the two prove to be the same, Provancher's name will have priority. The color of *P. politus* varies rather widely from that above given, a paler form having been described by Knight as:

1042a (—). *PLAGIOGNATHUS*
POLITUS FLAVEOLUS
Knight, 1923, 434.

In extremes of this form the vertex, front margin and middle spot of pronotum, scutellum except basal angles, base and apex of embolium, basal third or more of corium, basal half of cuneus, tibiae and middle of femora are dull greenish-yellow; remainder of body brownish-fuscous. Size and structural characters as in *politus*.

More common in southern Indiana in late summer and autumn than typical *politus*; Starke County only in the north, Aug. 20—Oct. 10. Sherborn, Mass., Sept. 20 (*Frost*). Occurs on flowers of goldenrod, thistle and other Compositæ. All variations in color between the extremes of this and *politus* are found. The range of var. *flaveolus* as given by Knight extends from Ontario and New England to Minnesota. He states that it "appears late in the season, no doubt belonging to the second brood of *politus*, and breeding on *Solidago* and related herbaceous plants."

Examples of *politus* var. *pallidicornis* Knight, distinguished as in *j* of key, p. 939, and having the same range as *flaveolus* are at hand from Porter Co., Ind., and Pottersville, N. Y.



Fig. 189, X 16. (After Forbes).

1043 (—). *PLAGIOGNATHUS REPETITUS* Knight, 1923, 453.

Black, moderately shining, sparsely clothed with fine yellowish hairs; membrane and veins uniformly pale fuscous; legs yellowish, basal half of coxæ fuscous, apical half of femora with one or two rows of vague small fuscous spots, black spots at base of tibial spines prominent; ventrals shining black. Joints 1 and 2 of antennæ black, 1 two-thirds as long as width of vertex, 2 three and a half times as long as 1; 3 and 4 dusky yellow, 3 three-fourths the length of 2, 4 two-thirds as long as 3. Length, 3 mm.

Whiteface Mt., N. Y., Aug. 22 (*Minn. Univ. Coll.*). Occurs on conifers in Nova Scotia, New England, New York and New Jersey.

1044 (1240). *PLAGIOGNATHUS ANNULATUS* Uhler, 1895, 51.

Color a nearly uniform dull brown to blackish, more or less translucent, rather thickly clothed with yellowish to whitish pubescence; cuneus often with a small spot on inner basal angle or a narrow lunule along fracture, paler; membrane uniformly pale translucent, the veins paler; legs dull yellow, femora either with a few blackish spots and lines on outer apical half or clouded with fuscous-brown, their tips paler; basal half of coxæ, apical tarsal joint and spots and spines of tibiæ, black; under surface dark brown to blackish, the sides of ventrals often paler. Joints 1 and 2 of antennæ dark brown, 1 five-sixths as long as width of vertex, 2 four times longer than 1; 3 and 4 dusky yellow, 3 two-thirds as long as 2, 4 three-fifths the length of 3. Pronotum nearly twice as wide at base as long, minutely irregularly rugose; calli rather prominent, confluent, with an impression between their bases. Clavus finely transversely rugose; corium minutely punctate. Length, 4—4.2 mm.

Putnam and Vigo counties, Ind., June 18—Aug. 26; taken from flowers of various species of Compositæ. Pine Island, N. Y., June 19 (*Davis*). Ranges from Ontario and New England west to Kansas and Colorado. Variable to some extent in color, the variations forming the basis of Knight's two varieties (1923, 442), *cuneatus* and *nigrofemoratus*, as set forth in the above key.

1045 (—). *PLAGIOGNATHUS CARINATUS* Knight, 1926, 10.

Dark brownish-black, clothed with yellow pubescence; vertex yellowish; base of cuneus subtranslucent; legs yellowish, hind femora with black spots as in key. Joint 1 of antennæ black, its tip narrowly pale, one-tenth shorter than width of vertex; 2 dark brownish, black at base, male, yellowish at middle, female, four times as long as 1, its length in male equal to width of head plus width of vertex, in female one-eighth shorter; 3 and 4 dusky yellow, 3 two-thirds the length of 2, twice as long as 4. Beak reaching hind margins of middle coxæ. Length, 3.8—4.2 mm.

Recorded only from Dewitt, Va., where it was found in June on persimmon, *Diospyros virginiana* L.

1046 (—). *PLAGIOGNATHUS LARICICOLA* Knight, 1923, 452.

Head, pronotum and scutellum fuscous-black, feebly shining, vertex sometimes yellowish; color of elytra as in key; membrane fuscous, veins pale, spot near apex of cuneus hyaline; legs dull fuscous-yellow, femora with small vague brownish spots, tarsi blackish; ventrals fuscous-black, covered with an opaque bloom. Joint 1 of antennæ black, 2—4 fuscous-brown; 1 four-fifths as long as width of vertex, 2 almost four times the length of 1, 3 and 4 united as long as 2. Length, 3.6—3.9 mm.

Ithaca, N. Y., June 27 (*Minn. Univ. Coll.*). Ranges from New England west to Minnesota and Alberta, occurring in June and July on tamarack, *Larix laricina* (Du Roi).

1047 (—). *PLAGIOGNATHUS NIGRONITENS* Knight, 1923, 435.

Color as in key; base of vertex dull yellow; membrane pale fuscous, a pale triangular spot near apex of cuneus; tarsi dull yellow, apical joint blackish; ventrals shining black. Joint 1 of antennæ black, two-thirds as long as width of vertex; 2 black, tip pale, three and one-half times as long as 1; 3 dull yellow, four-fifths the length of 2; 4 dusky, two-thirds as long as 3. Beak reaching between middle coxæ. Scutellum finely transversely rugose. Elytra scabrous. Length, 3 mm.

Grand Junction, Mich., July 15 (*Ill. Nat. Hist. Surv. Coll.*). Ranges from Ontario and New England west to Michigan and Minnesota. Resembles *politus* but smaller and with shorter beak.

1048 (—). *PLAGIOGNATHUS NIGRITUS* Knight, 1923, 441.

Color a uniform black or fuscous-black, rather thickly clothed with inclined whitish hairs; membrane translucent fuscous, feebly iridescent, the veins in part paler; tibiæ, trochanters, middle of beak and tips of femora pale yellow; black spots of tibiæ conspicuous. Antennæ fuscous-black, joint 1 slightly shorter than width of vertex, 2 nearly four times longer than 1, 3 about one-half the length of 2. Eyes of male very large, as long as width of vertex. Pronotum twice as wide at base as long, disk minutely punctate, each puncture bearing a fine whitish hair. Clavus and corium finely transversely rugose. Length, 4—4.4 mm.

Marion Co., Ind., June 5 (*W. S. B.*). Sherborn, Mass., Sept. 20 (*Frost*). Aberdeen, N. Car., June 6 (*Brimley*). Recorded only from Connecticut and Colorado.

1049 (—). *PLAGIOGNATHUS ROSICOLA* Knight, 1923, 446.

Color as in *o* of key, clothed with yellowish pubescence; scutellum and disk of cuneus slightly darker than pronotum; membrane a nearly uniform fuscous, a pale spot near apex of cuneus, veins paler; legs straw-yellow tinged with brownish, femora with two rows of prominent black spots on front face, and some less distinct spots on hind one, black spots at base of tibial spines prominent; sternum piceous, ventrals brownish-yellow, genital segments blackish. Joints 1 and 2 of antennæ black, their

tips narrowly pale, 1 almost as long as width of vertex, 2 four and three-fifths times as long as 1; 3 and 4 fuscous, 3 nearly three-fourths as long as 2, more than twice as long as 4. Length, 4.3—4.5 mm.

Recorded from Maryland, Illinois and Missouri. Occurs on wild roses.

1050 (—). *PLAGIOGNATHUS FULVIDUS* Knight, 1923, 447.

Fulvo-testaceous, clothed with rather fine yellow pubescence; entire under surface black, often with a reddish tinge; membrane fuscous, veins yellowish; legs yellowish, base of hind coxæ fuscous, hind femora with one or two rows of fuscous spots on front face, knees black, spots of tibial spines small. Joints 1 and 2 of antennæ black, 1 two-thirds as long as width of vertex, 2 four times as long as 1; 3 pale fuscous, black at base, two-thirds the length of 2; 4 fuscous, three-fifths as long as 3. Length, 3.5—4 mm.

Recorded from Connecticut, New Jersey and North Carolina.

1051 (—). *PLAGIOGNATHUS ATRICORNIS* Knight, 1926, 9.

Pale greenish-testaceous, clothed with pale yellowish pubescence; pronotum green, calli yellowish; elytra sub-translucent; membrane and veins uniformly pale fuscous, a small opaque whitish spot near apex of large cell; legs pale, femora with two rows of blackish spots on front face, black spots of tibial spines distinct. Joint 1 of antennæ almost as long as width of vertex, 2 slightly more than four times as long as 1, 3 two-thirds as long as 2, 4 one-half the length of 3. Beak reaching hind margins of middle coxæ. Length, 3.4—3.6 mm.

Known only from Point Treviorton, Pa. Resembles *P. chrysanthemi* (Wolff), but antennæ black and pubescence pale.

1052 (1234). *PLAGIOGNATHUS BLATCHLEYI* Reuter, 1912a, 61.

Elongate-oval. Pale greenish-yellow fading to dull yellow, thickly clothed with conspicuous yellow inclined hairs; tylus piceous-brown; membrane pale brown, its center and veins yellowish; legs yellow, femora with two rows of brown dots on both inner and outer faces; tibiæ with extreme base and apex, spines and their basal spots, black; tarsi fuscous-brown. Joints 1 and 2 of antennæ dark brown, their extreme tips pale; 3 and 4 pale fuscous; 1 three-fourths as long as width of vertex, 2 about four times as long as 1, 3 two-thirds the length of 2, 4 one-half as long as 3. Beak reaching hind coxæ. Disk of pronotum about two-thirds wider at base than long, calli rather prominent, transverse impression behind them deep, area behind it minutely thickly punctate. Scutellum and clavus finely, transversely strigose. Corium minutely and shallowly punctate, the costal margins feebly but visibly curved. Length, 4.5—4.7 mm.

Marion, Starke, Vigo and Crawford counties, Ind., June 17—Sept. 18. Taken in numbers June 22, 1892, in Vigo County from the foliage of the swamp rose, *Rosa carolina* L. Specimens were

soon afterward sent to Prof. Uhler, who named them "*Macrotylus blatchleyi* Uhl. (Ms.)." However, he never published the description and Van Duzee later sent specimens from Hamburg, N. Y., to Dr. Reuter, who described it twenty years after my first specimens were taken. In his notes preceding the description Reuter states: "Unter dem Namen *Macrotylus blatchleyi* Uhl. mscr., habe ich aus Nordamerika eine bisher unbeschriebene Miride bekommen. Diese ist jedoch gar kein *Macrotylus*, sondern gehört zur Gattung *Plagiognathus* Fieb." Recorded only from Maine, Massachusetts, New York and New Jersey.

1053 (—). *PLAGIOGNATHUS NUBILUS* Knight, 1923, 444.

Dull greenish-yellow with fuscous markings as in key; sparsely clothed with yellow hairs; head except tylus and front half of pronotum brighter green; basal half of pronotum either with three or four fuscous stripes or wholly fuscous; scutellum, embolium and cuneus a uniform paler yellow than corium; membrane dark fuscous, paler bordering veins and near tips of cuneus; femora with brown dots as in *blatchleyi*, also with a brown line on upper face and a shorter one on inner apical half of lower face. Structural characters much as in *blatchleyi*, the relative lengths of antennal joints slightly greater. Length, 4.2—4.5 mm.

Marion and Knox counties, Ind., July 5—Sept. 18. Swept from herbage in dense woodland along streams. The known range extends from New York west to Indiana and southward to Virginia. Described as a variety of *blatchleyi* but the much more sparse vestiture, fuscous markings of upper surface and dark stripes on femora lead me to place it as a distinct species.

1054 (—). *PLAGIOGNATHUS BREVIROSTRIS* Knight, 1923, 441.

Black, clothed with prominent yellowish pubescence; elytra with pale markings as in key; membrane fuscous, paler bordering tip of cuneus, veins yellowish; femora black, their tips, and sometimes base, pale; tibiæ dull yellow, knees, spines and spots at base, black; under surface black. Joints 1 and 2 of antennæ black, 1 almost as long as width of vertex, 2 four times as long as 1; 3 and 4 fuscous, 3 two-thirds the length of 2, nearly twice as long as 4. Female shorter and more robust than male, the pale color along claval suture spreading over outer margin of clavus; legs more broadly pale. Length, 4—4.6 mm.

Spruce Brook, Newfoundland, Aug. 9 (*Minn. Univ. Coll.*). Ranges from there and New England west to New York and Michigan.

1055 (—). *PLAGIOGNATHUS ALBORADIALIS* Knight, 1923, 439.

Black or fuscous-black, clothed with grayish-yellow pubescence; scutellum brownish on basal angles, rarely yellowish with median line

black. Elytra with pale markings as in key; membrane uniformly fuscous, male, veins and a vague spot near cuneus pale, female; legs pale to yellowish, femora with two rows of black spots on both inner and outer faces; under surface black with pale pubescence. Joints 1 and 2 of antennæ black, 2 narrowly pale at tip; 1 as long as width of vertex, 2 slightly more than four times the length of 1, twice as long as width of head across eyes; 3 and 4 pale fuscous, 3 three-fifths as long as 2, nearly twice as long as 4. Female more robust and more broadly pale than male, pronotal disk broadly pale. Length, 4.5—5 mm.

Starke Co., Ind., June 18 (*W. S. B.*). Cranberry Lake, N. Y., July 20—23 (*Minn. Univ. Coll.*). The recorded range extends from Ontario, and New England west to Ithaca, N. Y., mainly in the mountainous regions.

GROUP C.—PLAGIOGNATHUS.

To this group, as defined in the key, belong 15 species and five varieties of our eastern forms. The varieties are mere color forms, but as the key is based mainly on color characters, they are included in order that the student may be less confused in the naming of his species.

KEY TO EASTERN SPECIES AND VARIETIES OF GROUP C, PLAGIOGNATHUS.

- a. Scutellum and often the whole upper surface black.
- b. Elytra uniformly brownish translucent; pronotum and scutellum black. 1056. *SUFFUSCIPENNIS*.
- bb. Elytra uniformly black or blackish with pale.
- c. Cuneus pale or reddish, basal third or more of corium pale.
- d. Hind femora black, their tips only pale. 1057. *ALBONOTATUS*.
- dd. Hind femora dull yellow with two rows of conspicuous black dots on outer face and one on inner.
- e. Cuneus red; base of corium tinged with reddish. 1057a. var. *TINCTUS*.
- ee. Cuneus pale yellowish translucent; base of corium not tinged with reddish. 1058. *DEBILIS*.
- cc. Cuneus chiefly black; basal angles of corium not or scarcely pale.
- f. Femora pale or fulvous, usually spotted with black.
- g. Hind femora with two rows of prominent black spots on front face; joint 1 of antennæ black, narrowly pale at tip; beak reaching middle of hind coxæ.
- h. Joint 2 of antennæ in both sexes shorter than width of pronotum at base; length, 3.3—3.8 mm.
- i. Cuneus uniformly black like the corium; length, 3.6—3.8 mm. 1059. *PUNCTATIPES*.
- ii. Cuneus narrowly pale at base; length, 3.3 mm. 1060. *DISPAR*.
- hh. Joint 2 of antennæ longer than, male, or equal to, female, width of pronotum at base; length, 3.8—4 mm. 1061. *INOPINUS*.

gg. Hind femora pale, a single black spot on lower margin near apex; joint 1 of antennæ pale, blackish at base, joint 2 with basal fourth black; beak reaching first ventral.

1062. DAVISI.

ff. Femora black, their tips alone pale.

j. Cuneus with a pale lunule at base; joint 2 of antennæ with basal one-fourth black; membrane uniformly fuscous.

1042b. POLITUS var. PALLIDICORNIS.

jj. Cuneus uniformly black like the corium; joint 2 of antennæ pale yellow, narrowly black at base, its tip dusky; form suboval; deep black, strongly shining.

1063. FLAVICORNIS.

aa. Scutellum pale or fulvous, sometimes dark brownish, frequently with median line blackish, but with basal angles pale; elytra more or less pale, in darkest forms brownish-black, but always somewhat translucent.

k. Upper surface uniformly greenish-yellow, clothed with prominent black pubescence; antennæ with base of joints 1 and 2 and a ring before apex of 1, black.

1064. CHRYSANTHEMI.

kk. Upper surface darkened or marked with fuscous, pubescence pale; antennæ not marked as in *k*.

l. Joint 2 of antennæ uniformly pale, sometimes narrowly dusky at base, joint 1 black; femora with black spots.

m. Scutellum and cuneus wholly pale.

1065. ALBATUS.

mm. Median line of scutellum and apical half of cuneus blackish.

1065a. var. VITTISCUTIS.

ll. Joint 2 of antennæ black or fuscous at base.

n. Scutellum uniformly colored, or with median line paler than basal angles.

o. Femora pale or fulvous, with rows of distinct black spots; scutellum uniformly pale or with median line pale and basal angles dark; color rosy pink or fulvous tinged with dark brown.

1066. DELICATUS.

oo. Femora, except tips, dark with black spots vague; scutellum usually wholly dark fuscous-brown, similar to the whole upper surface.

1067. CORNICOLA.

nn. Scutellum with median line blackish, the sides pale or fulvous.

p. Cuneus uniformly pale.

q. Beak not reaching tips of middle coxæ; propleura clothed only with slender hairs; femora distinctly spotted with black.

1068. REPLETUS.

qq. Beak reaching hind coxæ; propleura clothed with silky pubescence; apical half of femora black without distinct spots.

1057b. ALBONOTATUS var. COMPAR.

pp. Cuneus fulvous or blackish toward apex.

r. Beak reaching first ventral; basal half of corium and more or less broadly each side of claval suture white; pale areas never fuscous, dark ones distinctly black.

1069. SIMILIS.

rr. Beak not reaching beyond middle of hind coxæ.

s. Elytra, except along base of radial vein, dark brown or fuscobrownish; general color yellowish-testaceous to fulvous; sides of pronotum and median line of scutellum dark brown or fuscous. 1070. CARYÆ.

ss. Elytra black; outer half of clavus, basal half of corium and extending along claval suture to apex, pale translucent.

1068a. REPLETUS var. APICATUS.

1056 (—). *PLAGIOGNATHUS SUFFUSCIPENNIS* Knight, 1923, 454.

Dark brown, shining; sparsely pubescent with very fine yellowish hairs; pronotum and scutellum blackish-brown; membrane pale fuscous-brown, veins yellowish; legs dull yellow, coxæ except tips, fuscous; femora usually with two rows of minute dark spots on inner and outer faces; under surface dark brown to blackish, shining, clothed with very fine yellowish prostrate hairs. Joint 1 of antennæ dark brown, narrowly paler at base and apex, two-thirds as long as width of vertex; 2 dusky yellow, darker at base, three and a half times longer than 1; 3 and 4 yellowish, 3 three-fifths as long as 2, 4 two-thirds as long as 3. Pronotum twice as wide at base as long, calli large, low, confluent, disk minutely transversely rugose. Clavus more coarsely, transversely rugose, corium almost smooth. Length, 3.2—3.4 mm.

Recorded only from Maine and Minnesota. Host plant, black spruce, *Picea mariana* (Mill.).

1057 (—). *PLAGIOGNATHUS ALBONOTATUS* Knight, 1923, 437.

Head black, base of vertex slightly paler; pronotum black, in female often with median pale spot; scutellum black, basal angles sometimes pale; elytra black, the basal third and apex of embolium, corium, and to some extent of clavus, anal ridges, and entire cuneus, greenish-yellow; membrane uniformly fuscous, veins paler; femora, except at base and tip, black; coxæ and tibiæ pale yellow, the knees, spines and spot at base of each, black; under surface black, ventrals of female paler on sides. Antennæ with joint 1 and base of 2 black, remainder pale yellow; joint 1 four-fifths as long as width of vertex, 2 three and one-half times longer than 1, 3 two-thirds as long as 2, 4 two-thirds the length of 3. Pronotum almost twice as wide at base as long, sides and basal margin straight, calli distinct, confluent, disk, as well as that of scutellum, minutely granulate. Elytra and pronotum sparsely clothed with fine yellowish suberect hairs; costal margins of former feebly but visibly curved. Length, 3.3—3.5 mm.

Porter Co., Ind., Sept. 26. Ranges from New England west to the Dakotas and Colorado. Occurs on the meadow-sweet, *Spiraea salicifolia* L. Knight (loc. cit.) described two color varieties, *tinctus* and *compar*, distinguished by the characters given in key. The former occurs in the east' ranging south to North Carolina, the latter he records only from Maine and New York.

1058 (—). *PLAGIOGNATHUS DEBILIS* sp. nov.

Greenish-yellow, thickly clothed above with conspicuous inclined yellowish hairs; tylus, cheeks and loræ dark brown, shining; pronotum wholly fuscous-black, male, front half only fuscous-black, female; scutellum of the same hue, its extreme tip pale; inner half of clavus and a large ill-defined spot on inner apical half of corium more or less fuscous; cuneus and embolium pale yellowish-translucent, the former rarely with a vague median fuscous spot; membrane fuscous, veins yellowish; legs dull yellow; hind femora with black dots as in *dd* of key; front and middle femora each with two rows of small vague brown dots; tibiæ with conspicuous black spots at base of spines; third joint of tarsi and claws fuscous; under surface blackish-bronzed, shining. Joint 1 of antennæ black, three-fifths as long as width of vertex, its apical incisure yellow; 2 dull yellow, basal sixth black, apex dusky, three and half times as long as 1; 3 and 4 dusky yellow, 3 one-half as long as 2, 4 two-fifths the length of 3. Beak reaching apex of middle coxæ. Length, 3.5—3.7 mm.

Marion Co., Ind., June 16—July 15. Frequent on the sandbar willow, *Salix fluviatilis* Nutt.

1059 (—). *PLAGIOGNATHUS PUNCTATIPES* Knight, 1923, 450.

Black, moderately shining, clothed with grayish- or pale yellowish pubescence; membrane uniformly fuscous, veins paler; legs pale yellow to fulvous, coxæ fuscous, hind femora with spots as in *g* of key, spots at base of tibial spines small, obsolete toward apex; under surface fuscous-black, clothed with very fine pale pubescence. Joint 1 of antennæ black, two-thirds as long as width of vertex; 2, yellowish, basal sixth blackish, four times as long as 1; 3 pale yellowish, two-thirds as long as 2; 4 dusky, three-fifths the length of 3. Beak reaching middle of hind coxæ. Length, 3.6—3.8 mm.

Ithaca, N. Y., June 27 (*Minn. Univ. Coll.*). Recorded only from there and Bloomfield, Pa.

1060 (—). *PLAGIOGNATHUS DISPAR* Knight, 1923, 451.

Fuscous-black, thinly yellowish pubescent; vertex yellowish; cuneus as in key; membrane pale fuscous, paler at middle and near apex of cuneus, veins yellowish to dusky; legs straw-yellow, hind coxæ, except tips, fuscous; front face of hind femora with two rows of minute fuscous spots, a group of similar spots on apical third of posterior face, spots at base of tibial spines very small; under surface black, finely pubescent. Antennæ as in *punctatipes*, joint 1 three-fourths as long as width of vertex. Length, 3.3—3.5 mm.

Dixon, Ill., May 31 (*Ill. Nat. Hist. Surv. Coll.*). Ranges from southern New England west to Michigan and Illinois, occurring on hickory. Described as a variety of *punctatipes*, but afterward (1926, 11) raised by Knight to specific rank on account of slight differences in male genitalia.

1061 (—). *PLAGIOGNATHUS INOPINUS* Knight, 1926, 11.

Dark brownish-black, clothed with yellowish pubescence; base of vertex and side margins of mesoscutum dull yellow; tip of embolium and inner basal angles of cuneus pale; membrane fuscous, veins and area along tip of cuneus paler; legs straw-yellow, femora with black spots as in *dispar*, black spots at base of tibial spines larger. Joint 1 of antennæ two-thirds as long as width of vertex; 2 yellow, fuscous at base, four and two-thirds times as long as 1; 3 yellowish to dusky, two-thirds as long as 2, 4 dusky, nearly three-fifths as long as 3. Length, 3.8—4 mm.

Known only from Harrisburgh, Pa., where it was taken in June on sycamore.

1062 (—). *PLAGIOGNATHUS DAVISI* Knight, 1923, 452.

Black or brownish-black, clothed with erect, rather sparse yellowish hairs; membrane brownish-fuscous, veins and narrow area bordering tip of cuneus paler; legs yellowish, apical third of front femora with a dark line on upper face, hind femora as in key, tarsi yellowish, third joint fuscous; under surface brownish-black. Joints 1 and 2 of antennæ as in key, 1 two-thirds as long as width of vertex, 2 three and a fourth times the length of 1; 3 and 4 yellowish, dusky at base, 3 about three-fifths the length of 2, but little longer than 4.

Known from a single female taken June 20 by W. T. Davis on Pine Island, N. Y.

1063 (—). *PLAGIOGNATHUS FLAVICORNIS* Knight, 1923, 436.

Deep black, strongly shining, clothed with yellowish to dusky pubescence; membrane and veins wholly dark fuscous; femora as in key, tibiæ pale, knees and spots at base of spines black; sternum black, opaque, ventrals shining black. Joint 1 of antennæ black, its tip pale, three-fourths as long as width of vertex; 2 as in key, as long as width of base of pronotum; 3 and 4 fuscous, 3 nearly three-fourths the length of 2, 4 two-thirds as long as 3. Beak scarcely reaching hind margin of middle coxæ. Mesoscutum broadly exposed. Scutellum minutely transversely rugose. Female more robust than male. Costal margins distinctly curved, elytra much broader just in front of cuneus than at base. Length, 3.3—3.5 mm.

Sun Lake, Ill., Aug. 9 (*Ill. Nat. Hist. Surv. Coll.*). A species of the Transition Life Zone, ranging from Ontario and New England west to Illinois and Minnesota. Host plants, the sweet fern, *Comptonia peregrina* (L.), and sweet gale, *Myrica gale* L.

1064 (—). *PLAGIOGNATHUS CHRYSANTHEMI* (Wolff), 1804, 151.

Elongate, subparallel, male, more oval, female. Greenish-yellow to grayish-green, clothed with prominent inclined blackish hairs, pronotum usually a clearer green; membrane pale fuscous, iridescent, a white triangular area near apex of cuneus and a small subquadrate black spot near apex of small cell; legs greenish-yellow, front face of femora with

two or three rows of black spots, black spots of tibiæ large; ventrals greenish-yellow. Antennæ yellowish, joint 1 with black rings as in key, shorter than head; 2 black at base, three times longer than 1; 3 and 4 filiform, 3 two-thirds the length of 2, 4 two-fifths as long as 3. Beak reaching second ventral. Length, 3.8—4.3 mm.

Ithaca, N. Y., June 30 (*Minn. Univ. Coll.*). Chalfont and Muswell Hill, England, July—August (*British Mus. Coll.*). A European species known in this country from Ontario, New England and New York. Host plant the oxeye daisy, *Chrysanthemum leucanthemum* L. As already noted, American records have mostly been under the name *Oncotylus punctipes* Reut.

1065 (1237). *PLAGIOGNATHUS ALBATUS* Van Duzee, 1915, 116.

Pale greenish-translucent, rather thickly clothed with whitish hairs; tylus and cheeks piceous; sides, or at least the basal angles, of pronotum, inner half or more of clavus and inner apical half of corium, strongly tinged with fuscous; membrane pale translucent with cells and ray along the margins dusky; hind femora with two rows of small vague blackish dots on outer face, tibiæ with black spots at base of spinules very small, apical half of tarsi and tip of beak fuscous; under surface yellow, female; ventrals and sterna black, male. Joint 1 of antennæ black, pale at tip, two-thirds as long as width of vertex; 2 and 3 yellow, 2 three and a half times longer than 1, 3 two-fifths the length of 2; 4 dusky, one-third as long as 3. Pronotum nearly twice as wide at base as long, sides feebly sinuate, hind margin almost straight, calli large, contiguous; disk, as well as that of clavus, and corium very minutely punctate, each puncture bearing a fine whitish hair. Length, 4—4.2 mm.

Marion Co., Ind., June 26. Dunedin, Fla., April 13; swept from low herbage along the margin of a moist hammock; the first records for both states. Not before recorded south of the District of Columbia. Ranges from New England west to California. Knight (1923, 445) gives the sycamore, *Platanus occidentalis* L., as the host plant. He there describes two varieties, one of which, *vittiscutis*, is a mere color form found on butternut and distinguished only by characters given in key. The other, *similis*, I regard as a valid species, and it is described below.

1066 (1230). *PLAGIOGNATHUS DELICATUS* (Uhler), 1887a, 34.

Pale brownish-yellow, often with a pinkish tinge; front of head each side with a short fuscous stripe; calli sometimes blackish or bordered behind by an impressed fuscous line; scutellum as in key; elytra tinged with fuscous-brown; cuneus with base and margins paler than the reddish disk; membrane dusky hyaline, a median area and spot each side near tip of cuneus whitish; legs dull yellow, femora as in key; tibial spines and spots at base and tips of tarsi blackish; ventrals dark brown,

sometimes reddish-yellow. Joint 1 of antennæ fuscous, pale at tip, two-thirds as long as width of vertex; 2 brownish-yellow, fuscous at base, one-fourth longer than pronotum; 3 and 4 dusky, 3 three-fifths as long as 2, 4 two-thirds the length of 3. Beak reaching upon hind coxæ. Pronotum very feebly punctate, clavus rather coarsely so. Length, 3—3.5 mm.

Batavia, N. Y., June 25 (*Minn. Univ. Coll.*). Described from Georgia. Recorded from New Jersey, Kansas and California. Occurs on honey locust, *Gleditsia triacanthos* L.

1067 (—). *PLAGIOGNATHUS CORNICOLA* Knight, 1923, 450.

Dark reddish- or fuscous-brown, thickly clothed with rather coarse semiprostrate yellow hairs; vertex in part, anal ridges, edge of costal margin and tip of embolium paler; membrane pale brownish translucent, veins yellowish; femora dark brown, their tips yellow; coxæ and tibiæ dull yellow; under surface shining brown, sides of ventrals in part paler. Joint 1 of antennæ and basal third of 2 dark brown to blackish; 1 slightly more than half as long as width of vertex; 2 nearly four times longer than 1, its apical two-thirds dull yellow; 3 and 4 pale fuscous, 3 nearly three-fourths as long as 2, 4 three-fifths the length of 3. Pronotum twice as wide at base as long, minutely and sparsely punctate. Length, 3.2—3.7 mm.

Marion and Vigo counties, Ind., June 3—15; beaten from dogwood, *Cornus alternifolia* L. Recorded from Massachusetts, New York and Virginia. Host plants, various species of *Cornus*.

1068 (—). *PLAGIOGNATHUS REPLETUS* Knight, 1923, 449.

Head black, paler on vertex; pronotum black, middle of disk and area between and in front of calli pale yellow; scutellum as in *nn* of key; elytra black, margins of clavus, basal third and line along claval suture of corium, embolium, cuneus and anal ridge, yellowish translucent; membrane fuscous, narrow area near tip of cuneus hyaline, veins pale yellow; legs straw-yellow, hind coxæ fuscous, apical half of hind femora brownish and with two rows of black spots; tibiæ with knees, spines and spots at their base black, tarsi fuscous; ventrals brownish-black. Joint 1 of antennæ black, its tip yellowish, three-fourths as long as width of vertex; 2 yellowish, basal fourth blackish, five and a third times the length of 1; 3 yellowish, fuscous at base, nearly one-half as long as 2; 4 dusky-yellow, as long as width of vertex. Length, 3.9 mm.

The typical form is known only from Batavia, N. Y.; the variety *apicalis* Knight, as differentiated in *ss* of key, from Connecticut and New York.

1069 (—). *PLAGIOGNATHUS SIMILIS* Knight, 1923, 445.

Greenish-yellow, thinly clothed with yellowish hairs; tylus, cheeks and loræ dark brown; pronotum with middle of disk and area in front of calli greenish-yellow, remainder dark brown; mesoscutum, broad median stripe of scutellum, inner half or all of clavus, a large spot on

apical half of corium and embolium, and spot on apical half of cuneus, dark brown; membrane with cells and a submarginal stripe on apical half brown, remainder of apical half and veins pale; hind femora dull yellow, with two rows of dark spots, front and middle femora with rows of smaller spots; under surface chestnut-brown, shining, the sides of ventrals in part pale. Joint 1 of antennæ black, its tip pale, two-thirds as long as width of vertex; 2 pale yellow, basal fourth black, three and a half times longer than 1; 3 and 4 yellowish, 3 two-thirds the length of 2, 4 five-eighths as long as 1. Pronotum twice as wide at base as long, calli large and low, separated by an impressed line; disk minutely punctate. Length, 3.5—3.8 mm.

Marshall Co., Ind., June 11; beaten from its host plant, *Alnus incana* (L.). Described as a variety of *albatus* Van D.

1070 (—). *PLAGIOGNATHUS CARYÆ* Knight, 1923, 448.

Color as in key, clothed with fine pale yellow pubescence; tylus and lower half of face fuscous; pronotum dark brown, middle of disk and calli more or less yellowish; scutellum brownish-yellow, median stripe and mesoscutum brownish-black; elytra as in key, basal half of embolium, anal ridges and inner basal angle of cuneus yellowish-translucent; membrane fuscous, veins yellowish, small spot near apex of cuneus whitish; legs straw-yellow tinged with dusky, femora often with two rows of small vague black spots on front face; ventrals fusco-yellowish. Joint 1 of antennæ black, its tip pale, three-fourths as long as width of vertex; 2 yellowish with fuscous ring at base, the apex dusky, four and two-fifths times the length of 1; 3 and 4 dusky yellow, 3 three-fifths as long as 2, 4 three-fifths the length of 3. Length, 3.4—3.9 mm.

Ithaca, N. Y., June 22 (*Minn. Univ. Coll.*). Recorded elsewhere from Batavia, N. Y., and Agricultural College, Miss. Occurs on hickory and pecan.

V. *MICROSYNAMMA* Fieber, 1864, 74.

Elongate-oval species having the head feebly exserted, twice as wide across eyes as long, its front pointed, subvertical; vertex convex, its crest almost level with upper margin of eyes; beak reaching hind coxæ; antennæ shorter than body; eyes large, prominent; pronotum trapezoidal, nearly twice as wide at base as long, sides straight, disk slightly declivent forward, hind margin straight; elytra entire, slightly surpassing abdomen, clavus convex, deflected to corium, cuneus and membrane slightly deflexed; femora rather stout, hind ones flattened on sides. One introduced European species occurs in the eastern states.

1071 (—). *MICROSYNAMMA BOHEMANNI* (Fallen), 1829, 106.

Fuscous-brown, shining, clothed with short yellow hairs; head with base of vertex and a streak along inner side of each eye yellowish; disk

of pronotum and scutellum often with a yellowish median line; mesoscutum with basal angles dull yellow; clavus with inner margin sometimes narrowly black, basal half of claval suture pale; basal third of corium and line extended back along claval suture, dull yellow; cuneus brown, basal fourth or more pale; membrane pale brownish-hyaline, slightly iridescent, inner cell and margin of outer one darker brown, veins whitish; coxæ pale yellowish, femora piceous-brown, extreme base and tips pale; tibiæ dull yellow, the dark spots at base of spines distinct; tarsi yellowish, third joint and claws brown; ventrals black or dark brown, shining. Antennæ fuscous-brown, tip of joint 1 narrowly pale; joint 1 clavate, two-thirds as long as width of vertex, 2 slightly thickened toward apex, three times as long as 1; 3 and 4 filiform, 3 two-thirds the length of 2, 4 one-half as long as 3. Length, 3.2—3.7 mm.

Honeoye Falls, N. Y., June 27 (*Minn. Univ. Coll.*). Deal, England (*British Mus. Coll.*). Known in this country from Newfoundland, Vermont, New York, Michigan and Colorado. Breeds on willow.

VI. CHLAMYDATUS Curtis, 1833, 197.

Small oblong or oblong-oval species having the head slightly broader than and contiguous with apex of pronotum, its front subvertical; eyes large, widely separated; vertex convex, obtusely margined at base; beak reaching or surpassing middle coxæ; antennæ about two-thirds the length of body, joint 1 half as long as width of vertex, 2 three times longer than 1; 3 and 4 more slender, 3 two-thirds as long as 2, 4 three-fifths the length of 3; pronotum trapezoidal, twice as wide at base as long, sides and hind margin straight, disk convex, feebly declivent forward; mesoscutum narrowly exposed; scutellum triangular, equilateral; elytra usually entire, surpassing abdomen; hind femora stout, saltatorial; joint 2 of hind tarsi shorter than 3, 1 two-thirds as long as 2.

Three species occur in our territory. They were formerly mostly recorded under the generic name *Agalliaestes* Fieb.

KEY TO EASTERN SPECIES OF CHLAMYDATUS.

- a.* Front and middle femora wholly pale; hind ones black; length, 2.5 mm. 1072. ASSOCIATUS.
- aa.* All the femora in part or wholly fuscous or black; tibiæ pale to dull yellow.
- b.* Femora black, their tips only pale; spines of tibiæ without a dark spot at base; length, 2.3 mm. 1073. SUAVIS.
- bb.* Apical third or more of femora pale; spines of tibiæ each with a distinct dark spot at base; length, 2.8 mm. 1074. PULICARIUS.

1072 (1260). *CHLAMYDATUS ASSOCIATUS* (Uhler), 1872, 419.

Oblong, subparallel, male; suboval, female. Black or fuscous-black, shining, sparsely clothed with fine black, suberect hairs; membrane dusky translucent, feebly iridescent, joints 1 and 2 of antennæ black, 3 and 4 and sometimes apex of 2 dusky yellow; front and hind coxæ, hind femora except tips and spines of tibiæ black; remainder of legs pale yellow; tips of tarsi and beak piceous. Beak reaching tips of hind coxæ. Front of pronotum less narrowed and calli more distinct than in our other two species. Length, 2.5 mm. (Fig. 190).



Fig. 190, X 12. (After Forbes).

Marion and Putnam counties, Ind., May 22—Oct. 5; frequent locally on both great and common ragweeds, flowers of *Cratægus*, etc. (W. S. B.). Swannanoa, N. Car., Oct. 5 (Brimley). Ranges from Que-

bec and New England west to the Pacific and southwest to North Carolina, Texas and New Mexico. Forbes (1900, 88) reports it as somewhat injurious to sugar beets. The elytra in some specimens taken in early summer are more fuscous-brown and more thickly pubescent with grayish hairs than those of later dates.

1073 (1259). *CHLAMYDATUS SUAVIS* (Reuter), 1876, 92.

Smaller and more oval than *associatus*. Color much the same; all the coxæ and femora black; tibiæ dull yellow to fuscous, their spines black, and, as in *associatus*, without spots at base; antennæ sometimes wholly fuscous-black, more often with apical half of joint 2 and all of 3 and 4 dusky yellow. Pronotum with front narrower and calli less evident than in *associatus*. Length, 2—2.3 mm.

Marion, Knox and Posey counties, Ind., Aug. 19—Sept. 22; swept from roadside herbage. Dunedin, Fla., Jan. 20—April 4; swept from ferns along the margins of hammocks. Raleigh and Hendersonville, N. Car., June—July (Brimley). Ranges from Ontario and New York west to Kansas and southwest to Florida, Texas and California. Host plant, ragweed.

1074 (1258). *CHLAMYDATUS PULICARIUS* (Fallen), 1807, 95.

Oblong-oval. Fuscous-black, sparsely clothed with short grayish or yellowish hairs; membrane and veins uniformly blackish, iridescent;

tibiæ and tarsi pale, joint 3 of tarsi and claws black; ventrals black. Antennæ with joint 2 except tip and base of 1, black, remainder pale brownish-yellow. Female more robust than male, with legs and antennæ more broadly pale; sometimes brachypterous, then broadly oval with elytra reaching only to tip of abdomen, the membrane very short. Length, 2.8—3 mm.

Rock Creek, N. Y., July 4 (*Minn. Univ. Coll.*). Donau-Aubei, Wien (*British Mus. Coll.*). A European species, known in this country only from New York, where it breeds on plantain. Occurs in Europe on dwarf willow.

VII. CAMPYLOMMA Reuter, 1878, 52.

Differs from *Chlamydatus* chiefly by the characters given in the generic key. One species is known.

1075 (1267). CAMPYLOMMA VERBASCI (Meyer), 1843, 70.

Oblong-oval. Pale greenish- or straw-yellow clothed with suberect dusky pubescence; tylus often black; head, mesoscutum and base of scutellum tinged with reddish-yellow, disk of cuneus pale brownish; membrane uniformly dusky hyaline; under surface blackish-brown; legs yellowish, femora and tibiæ spotted with black. Antennæ dull yellow, apical half or less of joint 1 and narrow base of 2 black, the relative length of the joints nearly as in *Chlamydatus*. Length, 2.5—2.9 mm.

Le Sueur Co., Minn., Sept. 13 (*Minn. Univ. Coll.*). Payerbach, Austria (*British Mus. Coll.*). A European species recorded in this country from Quebec, Ontario, New England, New York and British Columbia. Host plant, mullein, *Verbascum thapsus* L. Occurs also on apple, where it feeds on the honey dew of aphids.

VIII. LEUCOPÆCILA Reuter, 1907b, 24.

Small oblong or wedge-shaped shining species having the head broader across eyes than apex of pronotum, its front vertical, vertex flat, not margined; eyes large, overlapping and contiguous with front angles of pronotum; beak reaching or slightly surpassing hind coxæ; pronotum short and wide, base but little wider than vertex, hind angles prominent, slightly nodulose, base broadly and shallowly concave, calli indistinct; mesoscutum broadly exposed; elytra entire, distinctly surpassing abdomen, male, slightly so, female; membrane long and narrow, cuneus horizontal; hind femora short, stout; hind tibiæ long, slender, without black spots; joints 2 and 3 of hind tarsi subequal, 1 shorter. One species is known.

1076 (1249). *LEUCOPCECILA ALBOFASCIATA* Reuter, 1907b, 26.

Male—Oblong, narrowed behind. Head, pronotum and scutellum black or very dark brown, shining; elytra pale yellow, sparsely pubescent with inclined yellowish hairs; costal margin and outer apical third of corium, base and apex of clavus, and cuneus except narrowly at base, dark brown; basal half and veins of membrane yellowish translucent, apical half fuscous; femora dark brown, their tips yellow; tibiæ dull yellow, hind ones darker at base; tarsi piceous-brown. Joint 1 of antennæ stout, black, clavate or obconical, surpassing tylus by half its length; 2 dark brown, thickly hirsute, subfusiform, compressed, grooved beneath, about twice as long as 1; 3 and 4 brown, much more slender, 3 slightly longer than 2, 4 about one-fifth the length of 3. Clavus and corium finely transversely rugose. Length, 2—2.2 mm. *Female*—Shorter and more parallel. Antennæ more slender, joint 1 but slightly surpassing tylus, 2 slender at base, much thickened toward apex. Elytra not or but slightly surpassing abdomen; cuneus as broad at base as long. Length, 1.5—1.8 mm.

Caxambus, Fla., March 8 (*H. S. B.*). Raleigh, N. Car., Sept. 4 (*Brimley*). A neotropical species described from Jamaica and hitherto recorded in this country only from Bellaire, Fla.; Pennsylvania and California. Wirtner (1904, 202) mentioned it, under the name of *Rhinacloa forticornis* Reut., as "common in hay fields at Greensburg, Pa., July to September; abundant in fields where the grain has been cut." Specimens were sent by him to Reuter, who corrected his identification. Van Duzee (1914, 31) states that near San Diego, Cal., it is "common in alfalfa fields throughout the year."

SUBTRIBE II.—PHYLINI.

KEY TO GENERA OF SUBTRIBE II, PHYLINI.

- a. Joint 2 of antennæ slender in both sexes, never exceeding the thickness of joint 1.
- b. Color greenish-yellow, elytra with more or less conspicuous fuscous markings; pseudarolia attached only at base of claw, tips free and extending to middle of claw (pl. X, fig. 2).

IX. *REUTEROSCOPIUS*, p. 950.

- bb. Color not as in b; pseudarolia usually minute, connate and not extending free for a space greater than base of attachment.
- c. Tylus well separated from the front by a distinct suture.
- d. Second antennal shorter than width of head across eyes; tibiæ usually black, strongly spinose; form short, ovate, conspicuously clothed with both appressed scale-like hairs and suberect pubescent ones.

X. *LEPIDOPSALLUS*, p. 951.

- dd. Second antennal as long as or longer than width of head; tibiæ usually pale, with dark spot at base of spines; form more elongate; scale-like hairs of elytra less conspicuous.

XI. *PSALLUS*, p. 954.

- cc. Tylus merged with the front, the suture separating them wanting or very obscure; legs pale, femora not spotted; second antennal annulate with black. XII. CYLLOCEPS, p. 960.
- aa. Joint 2 of antennæ more or less strongly thickened or flattened, at least its apical half distinctly thicker than joint 1.⁹⁴
- e. Head distinctly produced in front of eyes; color black or fuscous-brown clothed with conspicuous white scale-like pubescence.
- f. Joint 2 of antennæ strongly swollen in male, slender in female; elytra, including cuneus, wholly black. XIII. CRIOCORIS, p. 960.
- ff. Joints 1 and 2 of antennæ strongly swollen in both sexes; elytra fuscous-brown, cuneus with tip and a lunule at base yellowish. XIV. EXCENTRICUS, p. 961.
- ee. Head not or scarcely produced in front of eyes.
- g. Beak not surpassing middle coxæ; joint 2 of antennæ clavate in female, terete and much thicker in male, but slightly longer than 3 and 4 united. XV. RHINACLOA, p. 962.
- gg. Beak reaching or surpassing hind coxæ; joint 2 of antennæ much swollen and thickened toward apex at least in female, subequal in length to 3 and 4 united. XVI. ATRACTOTOMUS, p. 963.

IX. REUTEROSCOPIUS Kirkaldy, 1905, 268.

Small elongate-oblong, smooth pubescent species having the head longer than wide, declivent, prolonged in front of eyes, vertex convex, not margined at base; eyes rather small, contiguous to pronotum; antennæ slender, shorter than body, joint 1 not reaching tip of tylus; beak reaching hind coxæ; pronotum trapezoidal, slightly longer than width of apex, base twice as wide as apex, sides straight, base truncate, disk convex, feebly declivent forward; mesoscutum narrowly exposed; elytra entire, surpassing abdomen; hind tibiæ very long, their spines black but without spots at base. Two species occur in our territory.

KEY TO EASTERN SPECIES OF REUTEROSCOPIUS.

- a. Femora dull yellow without fuscous spots; apex of corium with fuscous cross-bar. 1077. ORNATUS.
- aa. Femora thickly flecked with small pale fuscous spots; corium with only inner apical angle fuscous. 1078. SULPHUREUS.

1077 (1213). REUTEROSCOPIUS ORNATUS (Reuter), 1876, 90.

Dull greenish-yellow, basal half of pronotum darker green; scutellum, clavus and a bar across apical fourth of corium fuscous-brown to black; membrane fuscous, veins sometimes paler; legs dull yellow, tarsi darker; under surface greenish-yellow, genital segments often darker. Joints 1 and 2 of antennæ dull yellow, 1 three-fourths as long as width of

⁹⁴Not thicker than joint 1 in female of *Criocoris saliens* (Reut.) nor in male of *Atractotomus magnicornis* (Fall.).

vertex, 2 four times longer than 1; 3 and 4 dusky yellow, united slightly longer than 2. Length, 3—3.4 mm.

Frequent throughout southern Indiana, less so in the northern counties, June 10—Sept. 13. Dunedin, Fla., Oct. 28—April 13 (*W. S. B.*). Agricultural College, Miss. (*Wcd*). Recorded from Sanford and Crescent City, Fla. Occurs on weeds and other low herbage along roadsides and on ferns in dense woods and hammocks. Ranges from Ontario and New England west to Colorado and Kansas, and southwest to Florida, Texas and the West Indies. The older records were under the generic name *Episcopus* Reut., which was preoccupied. A color variety with outer half of clavus pale and cross-bar of corium reduced to a spot on each, is known as variety *uvirus* (Dist.). Host plant, ragweed.

1078 (1217). *REUTEROSCOPIUS SULPHUREUS* (Reuter), 1907b, 23.

Dull yellow, often with a greenish tinge; clothed with yellowish to fuscous hairs, each arising from a minute fuscous spot, also with minute tufts of silvery scale-like hairs arranged in rows on median line and outer margins of head and pronotum, and disks of clavus and corium; inner apical angles of corium, tip of clavus and spot on inner margin of cuneus, fuscous; membrane hyaline, with minute fuscous spots near apex and on margins just behind tip of cuneus. Length, 3.3 mm.

Rock Island, Tex., June 9 (*Minn. Univ. Coll.*). A neotropical species, described from Jamaica and recorded from Estero, Tampa and Sevenoaks, Fla., by Van Duzee and from Massachusetts and Missouri by Knight. Occurs on ragweed.

X. *LEPIDOPSALLUS* Knight, 1923, 470.

"Form short, ovate; body clothed with closely appressed scale-like pubescence, interspersed with more erect simple pubescent hairs; head broad; antennal segment 2 in length not equal to width of head; tibiæ strongly spinose; claws and pseudarolia as shown in pl. X, fig. 3." (*Knight*).

This genus was founded by Knight with *Sthenarus rubidus* Uhl. (1895, 41), the No. 1256 of the Van Duzee Catalogue, as the genotype. Seven species are known from the eastern states.

KEY TO EASTERN SPECIES OF *LEPIDOPSALLUS*.

- a. Beak not reaching beyond hind coxæ.
- b. Second antennal scarcely longer than length of pronotum.
- c. Larger, length, 3.2—3.5 mm.; joints 3 and 4 of antennæ united slightly longer than joint 2; color black and reddish (wholly

black in var. *atricolor*), embolium and cuneus usually strongly reddish. 1079. RUBIDUS.

cc. Smaller, length, 2.7 mm.; joints 3 and 4 of antennæ united equal to or slightly shorter than 2; color wholly black. 1080. MINUSCULUS.

bb. Second antennal as long as pronotum plus the dorsal width of an eye; length not over 3 mm.

d. Color above black; length, 2.7 mm. 1081. OLSENI.

dd. Color above reddish, or yellowish tinged with fuscous.

e. Joints 1 and 2 of antennæ wholly yellowish; elytra in great part reddish.

f. Femora dull red, paler at tips; whitish scales of upper surface elongate. 1082. MINIATUS.

ff. Femora wholly pale yellow; whitish scales of upper surface oval, conspicuous. 1083. AUSTRALIS.

ee. Joint 2 of antennæ blackish, pale at middle, female, yellowish, apical third fuscous, male; elytra dull yellowish-translucent, often tinged with fuscous. 1084. PUSILLUS.

aaa. Beak reaching or surpassing third ventral; joints 1 and 2 of antennæ pale yellowish; sides of ventrals without scale-like hairs. 1085. CLARICORNIS.

1079 (1256). LEPIDOPSALLUS RUBIDUS (Uhler), 1895, 41.

Elongate-oval. Head, front half or more of pronotum and scutellum, fuscous-black; elytra and basal half of pronotum varying from pale fuscous-brown to blackish, the base of corium usually paler; membrane uniformly fuscous, veins yellowish; legs black or brownish, often in part reddish, tibiae with prominent black spines; ventrals reddish-brown to black, shining, thinly clothed with silvery scales. Joint 1 of antennæ dark brown, less than half as long as width of vertex; 2 reddish-yellow, dusky at base and apex, or wholly blackish, four times as long as 1, in female more slender with apical half more thickened than in male; 3 and 4 dusky-yellow, 3 three-fifths as long as 2, 4 one-fifth shorter than 3. Pronotum nearly twice as wide at base as long, disk minutely transversely wrinkled. Elytra finely scabrous. Length, 3—3.5 mm.

Marion Co., Ind., July 10—15; beaten from willow (*W. S. B.*). Savanna, Ill., July 21—Aug. 11; taken from willows on sand-bars (*Ill. Nat. Hist. Surv. Coll.*). Recorded from Bellaire, Fla. Ranges from New England and New York west to Kansas and Colorado, and southwest to Florida, Texas and Cuba. Breeds on willow. The melanistic form, var. *atricolor* Knight, with scales silvery-gray, often occurs with the typical form on the same clump of willows.

1080 (—). LEPIDOPSALLUS MINUSCULUS Knight, 1923, 472.

Broadly oval. Black, moderately shining, the silvery scales very prominent, truncate at apex; membrane and veins uniformly fuscous;

legs black, tarsi fuscous, some of the tibial spines more than twice as long as the thickness of tibia; ventrals black, clothed with silvery scales. Joints 1 and 2 of antennæ black, 2 cylindrical, equal in thickness to 1, one-fifth longer than width of pronotum at base; 3 and 4 pale fuscous, 3 three-fifths as long as 2, 4 two-thirds the length of 3. Length, 2.4—2.6 mm.

Recorded only from White Plains, N. Y., where it was taken July 10 by Bueno on apple.

1081 (—). *LEPIDOPSALLUS OLSENI* Knight, 1923, 473.

Oblong-oval, flattened above. Black with pubescence as in the other species, the silvery scales scarcely truncate at tip; membrane pale fuscous, veins reddish-brown; legs black, tibiæ tinged with reddish. Joint 1 of antennæ one-half as long as width of vertex, 2 four times as long as 1, feebly thickened from base to apex, more slender than 1; 3 one-half as long as 2. Length, 2.7 mm.

Described from a single female taken July 28 by Olsen at Pigeon Cove, Mass.

1082 (—). *LEPIDOPSALLUS MINIATUS* Knight, 1926a, 226.

Oblong-oval. Above fuscous-brown and reddish, sparsely clothed with conspicuous appressed scale-like hairs and finer suberect brownish ones; head fuscous or reddish-fuscous; pronotum fuscous-brown at middle, the sides reddish; mesoscutum and scutellum reddish to fuscous; elytra in great part fuscous-brown, cuneus and usually the apical third or more of embolium, a clearer red; membrane pale brownish translucent, veins reddish or yellowish; femora reddish, their apical fourth pale yellow; tibiæ dull yellow with conspicuous black spines, coxæ and tarsi fuscous; under surface dull yellow, ventrals tinged with reddish. Joints 1 and 2 of antennæ wholly pale yellow, 3 and 4 dusky yellow; 1 very short, scarcely one-half as long as width of vertex, 2 feebly but visibly thickened from base to apex, four times longer than 1, 3 and 4 united one-fifth shorter than 2, 4 two-thirds as long as 3. Pronotum twice as wide at base as long, apex two-thirds as wide as base, disk minutely transversely wrinkled. Costal margins of elytra broadly but distinctly curved. Length, 2.8—3 mm.

Dunedin, Ft. Myers and Hillsboro Canal, Fla., Feb. 19—April 8; beaten from foliage of live oak and wax-myrtle, sifted from the mucky debris of an extinct wet weather pond and swept from low herbage along the bay front. Known also from South Carolina.

1083 (—). *LEPIDOPSALLUS AUSTRALIS* sp. nov.

Elongate-oval. Dull red, above thickly clothed with conspicuous, oval appressed whitish scales, intermixed with short inclined blackish hairs; scutellum, embolium and cuneus a somewhat brighter red; mem-

brane pale fuscous hyaline; legs wholly a pale straw-yellow, tibial spines, third tarsal and claws blackish. Joints 1 and 2 of antennæ pale yellow, 1 two-fifths as long as width of vertex; 2 feebly thickened toward apex, four and a half times as long as 1; 3 and 4 fuscous, 3 three-fifths the length of 2, 4 one-half as long as 3. Tylus broad, feebly convex, the suture at base scarcely evident. Scutellum with a distinct median concavity. Length, 3 mm.

Dunedin, Fla., Feb. 8; one female taken at desk light. Allied to *miniatus* but very distinct by the characters given above and in key.

1084 (—). *LEPIDOPSALLUS PUSILLUS* Knight, 1926a, 227.

Oblong, sides subparallel, male, more broadly oval, female. Dull greenish-yellow, sparsely clothed with suberect dusky hairs and scattered appressed deciduous silvery scale-like ones; scutellum, disk of basal half of pronotum, and often the greater part of corium, tinged with greenish-fuscous; line along claval suture often fuscous-brown; membrane dusky-hyaline, the veins slightly darker; legs dull yellow without black spots, spines of tibiæ blackish, the dark spots at base very small; ventrals greenish-yellow, darker on sides. Joint 1 of antennæ dull yellow, only about one-third as long as width of vertex; 2 as in key, visibly thickened apically, female, cylindrical, with apical third only fuscous, male, four times as long as 1; 3 and 4 dusky-yellow, more slender, 3 one-third longer than 4. Beak reaching between middle coxæ. Pronotum and elytra finely scabrous. Length, 1.8—2.4 mm.

Dunedin, Gainesville, Canal Point, Miami and R. P. Park, Fla., Oct. 25—April 15. Common in autumn and spring on tall dead grasses and other herbage along the margins of ponds and sloughs; in winter hibernating in bunches of dead vines and Spanish moss.

1085 (—). *LEPIDOPSALLUS CLARICORNIS* Knight, 1923, 471.

Oblong-oval. Brownish-black, the upper surface only with scale-like pubescence; membrane and veins pale brownish; legs brownish-black, tips of femora and coxæ slightly paler; tibiæ pale yellowish, their spines without black spot at base, tarsi pale, tips fuscous; under surface dark brownish, clothed only with fine brownish hairs. Joint 1 of antennæ pale yellowish, three-fifths as long as width of vertex, 2 uniformly yellowish, dusky-pubescent, four times as long as 1. Beak reaching base of ovipositor. Length, 3.1 mm.

Described from a single female taken May 29 by Davis at Lakehurst, N. Jer.

XI. *PSALLUS* Fieber, 1858, 321.

Oblong or elongate, subparallel, shining pubescent species having the head wider across eyes than apex of pronotum, its

front subvertical, tylus narrow, compressed, vertex feebly convex, not carinate at base; eyes large, coarsely faceted, contiguous to pronotum, larger in male than female; antennæ shorter than body, joint 2 as long as or longer than width of base of pronotum; beak reaching or surpassing middle coxæ; pronotum trapezoidal, sides straight or nearly so, disk feebly convex, declivent forward, hind margin truncate; mesoscutum narrowly exposed; elytra entire, surpassing abdomen; cuneus feebly deflexed, its fracture weak. Twelve species have been recorded from the eastern states. The genus, as treated, includes the two eastern species of *Apocremnus* Fieb., listed by Van Duzee.

KEY TO EASTERN SPECIES OF PSALLUS.

- a. Femora pale, or pale with black spots but without black line on upper margin.
- b. Cuneus either red or yellow flecked with reddish dots; femora pale tinged with red and spotted with brown or fuscous; cuneus pale at base; larger, length, 3.5—4 mm.
- c. Upper surface greenish- or straw-yellow, thickly flecked with reddish-brown dots. 1086. GUTTULOSUS.
- cc. Upper surface carmine red, more or less heavily tinged with fuscous. 1087. ALNICOLA.
- bb. Cuneus not red or flecked with reddish dots.
- d. Upper surface greenish- or yellowish-white, thickly flecked with minute brownish or fuscous dots; femora with rows of black dots. 1088. SERIATUS.
- dd. Upper surface not greenish-yellow; femora without black dots.
- e. Upper surface uniformly black; femora pale. 1089. STROBICOLA.
- ee. Upper surface mainly reddish-brown to piceous-black; femora usually in great part reddish-brown. 1090. VARIABILIS.
- aa. Femora dark brown or blackish, often pale to yellowish with spots, but then always with a dark line on upper margin.
- f. Joint 2 of antennæ longer than three-fourths the width of pronotum at base.
- g. Scutellum with side margins more or less pale (if wholly black, then cuneus pale); cuneus pale yellowish tinged with fuscous, slightly infuscated at apex. 1091. ALNICENATUS.
- gg. Scutellum wholly black; cuneus always with blackish, frequently pale at base, but legs and elytra never tinged with fulvous.
- h. Beak reaching first ventral; elytra uniformly black; femora black, their tips pale; length, 3.6 mm. 1092. MORRISONI.
- hh. Beak scarcely reaching hind coxæ; base of cuneus and usually tip of embolium and spot on base of corium pale; length, 4—4.6 mm. 1093. PARSHLEYI.
- ff. Joint 2 of antennæ equal to or shorter than three-fourths the width of pronotum at base.

- i. Second antennal just equal to width of head, female, slightly greater, male; hind femora fusco-brownish to black, front and middle ones more yellowish; each with two black spots on upper margin of apical half. 1094. WALDENI.
- ii. Second antennal distinctly longer than width of head.
 - j. Antennæ pale, pubescence dusky; legs dark brown or black, tibiæ and tips of femora pale, tibial spines with small fuscous spots at base. 1095. PICEICOLA.
 - jj. Antennæ black, or at least joint 1 black.
 - k. Legs testaceous to brownish, femora sometimes nearly black, but their tips never pale, hind pair much swollen; coxæ and tibiæ more or less tinged with reddish. 1096. ANCORIFER.
 - kk. Legs chiefly black; femora black, tips of front and middle ones pale; coxæ deep black; tibiæ pale, their spines with black spot at base. 1097. DRAKEI.

1086 (1215). *PSALLUS GUTTULOSUS* Reuter, 1876, 89.

Dull greenish-yellow, thickly sprinkled with small reddish-brown or fuscous spots; pronotum with a vague pale median stripe; cuneus dull yellow, usually heavily tinged with red, its extreme base pale hyaline; membrane pale dusky brown, paler near apex of cuneus, veins yellowish; legs greenish-yellow, femora with numerous scattered reddish-brown dots, more conspicuous on hind ones; tibial spines black, each with a small fuscous spot at base; under surface straw yellow; ventrals tinged with reddish. Joints 1 and 2 of antennæ pale yellow; 1 three-fourths as long as width of vertex, 2 four times as long as 1; 3 dusky yellow, 4 fuscous, the two united two-thirds the length of 2. Length, 3.5—3.7 mm.

Ormond, Sanford, Lake Wales, Ft. Myers and Dunedin, Fla., March 16—April 6. Beaten from foliage of shrubs along the margins of hammocks and swept from herbage along the bay front. Recorded from Bellaire and Jacksonville, Fla.; Georgia, Texas, Colorado and Lower California.

1087 (—). *PSALLUS ALNICOLA* Douglas & Scott, 1871, 62.

Color as in key, clothed with scattered patches of long appressed yellowish hairs; disk of pronotum with a few scattered minute fuscous spots; tip of scutellum brownish, of clavus narrowly blackish; cuneus carmine red, its basal margin yellowish; membrane fuscous-black, marbled with whitish, veins reddish; legs red, apical halves of femora dotted with black, tibiæ with distinct black spots at base of spines, tarsi brownish-yellow; ventrals piceous, genital segment red. Joint 1 of antennæ reddish-brown, three-fourths as long as width of vertex; 2 brownish-yellow, paler toward base, three and one-half times as long as 1; 3 and 4 dusky, 3 two-fifths as long as 2, 4 one-half the length of 3. Length, 3—3.6 mm.

Cheshunt and Leominster, England, Aug. 13—29 (*British Mus. Coll.*). A European species recorded in this country from

New Hampshire, New York and Minnesota. Host plant, *Alnus rugosa* (Du Roi).

1088 (1218). *PSALLUS SERIATUS* (Reuter), 1876, 91.

Pale greenish-yellow, thickly flecked with minute reddish-brown or fuscous dots; head and margins of pronotum sometimes a deeper yellow; extreme tip of cuneus often dark brown; membrane pale hyaline, the basal half vaguely fuscous, veins yellow; legs greenish yellow, femora dotted with fuscous; tibial spines and spots at their base black, the spots conspicuous; tarsi fuscous; under surface straw-yellow, finely pubescent. Joints 1 and 2 of antennæ yellow, dotted with black; 1 two-thirds as long as width of vertex; 2 four times longer than 1, nearly as stout, male, more slender, female; 3 and 4 fuscous, much more slender, united slightly shorter than 2. Pronotum more than twice as wide at base as long; calli rather prominent, well separated; disk, as well as that of elytra, with suberect black hairs intermixed with very fine prostrate ones. Length, 2.5—2.8 mm.

Dunedin, Fla., March 28—April 16; swept from grasses along the margins of hammocks and ponds (*H. S. B.*). Claremont, Cal. (*Gerhard*). Recorded from Sevenoaks, Tampa and Atlantic Beach, Fla. Ranges from Maryland southwest to Arizona and from Colorado to the Pacific. The Claremont specimens are smaller, paler, with fewer dots on antennæ and smaller ones on hind femora than those from Florida.

1089 (—). *PSALLUS STROBICOLA* Knight, 1923, 467.

Fuscous-black, clothed with closely appressed silvery-gray hairs mixed with suberect dusky ones; membrane and veins uniformly fuscous; legs yellow, coxæ blackish, paler at tips; tibial spines black, without black spots at base. Antennæ yellow, joint 1 one-half as long as width of vertex, 2 five and three-fifths times as long as 1, 3 two-thirds the length of 2, 4 three-fifths as long as 3. Beak reaching first ventral. Length, 3.1—3.5 mm.

St. Anthony Park, Minn., July 14 (*Minn. Univ. Coll.*). Recorded elsewhere only from Quebec and New York. Breeds on white pine, *Pinus strobus* L.

1090 (1244). *PSALLUS VARIABILIS* (Fallen), 1807, 88.

Head dull yellow to black; antennæ straw-yellow, base of joint 1 black; pronotum and scutellum usually black or brownish-black; elytra variable, reddish-yellow to piceous, corium in dark specimens with outer half dark brown, tinged with reddish; cuneus reddish-brown or black, its base narrowly pale; membrane fuscous, iridescent, often with a vague curved pale streak at middle, a white mark between cells and tip of cuneus, basal half of outer cell white, veins brown; legs reddish-brown to blackish, in darker forms the femora more or less yellowish apically, tibiae yellow with short erect black spines arising from black spots;

tarsi yellowish, joint 1 and sometimes 3 brown. Antennæ straw-yellow, joint 1 dark at base, two-thirds as long as width of vertex, 2 three and one-half times the length of 1, 3 three-fifths as long as 2, 4 one-third the length of 3. Upper surface clothed with short appressed yellow hairs. Length, 3 mm.

Epping Forest, England, June 10—15 (*British Mus. Coll.*). A European species recorded in this country from Ontario and New York.

1091 (—). *PSALLUS ALNICENATUS* Knight, 1923, 466.

Elongate, sides subparallel, male, suboval, female. Head fuscous-black, vertex yellowish-brown; pronotum blackish, basal half paler; elytra yellowish-brown to dusky, subtranslucent, clavus and apical half of corium tinged with fuscous; membrane pale fuscous, a hyaline paler spot near tip of cuneus, veins yellowish; legs dull yellow, femora with two rows of black spots on outer face and a vague dark line above; knees, tibial spines and spot at base of each, black; ventrals black, yellowish-pubescent. Joint 1 of antennæ black, tip pale, almost as long as width of vertex; 2 fuscous-brown, tip and often the middle, paler, about four times as long as 1; 3 and 4 pale fuscous, 3 three-fourths as long as 2, 4 three-fifths the length of 3. Beak reaching first ventral. Length, 3.7—4.5 mm.

Ithaca, N. Y., July 26 (*Minn. Univ. Coll.*). Ranges from Nova Scotia and New England west to Minnesota. Breeds on hoary alder, *Alnus incana* (L.).

1092 (—). *PSALLUS MORRISONI* Knight, 1923, 464.

Elongate, subparallel, male, suboval, female. Black or fuscous-black, thickly clothed with appressed silvery hairs; membrane uniformly fuscous, veins slightly paler; femora as in key; ventrals black, with scale-like pubescence on sides. Joint 1 of antennæ black, four-fifths as long as width of vertex; 2 dark brown, paler at middle, three and two-third times longer than 1, in male as long as width of pronotum at base; 3 brownish-yellow, three-fourths the length of 2; 4 pale fuscous, two-thirds as long as 3. Length, 3.2—3.6 mm.

Cramer and Lake Co., Minn., Aug. 10—15 (*Minn. Univ. Coll.*). Recorded only from Massachusetts, where it was collected from sweet fern and goldenrod.

1093 (—). *PSALLUS PARSHLEYI* Knight, 1923, 465.

Head black, vertex somewhat paler; pronotum and scutellum black, both they and elytra clothed with pale appressed scale-like hairs and suberect yellowish ones; elytra black, with pale markings as in key; membrane fuscous, a pale spot near tip of cuneus, veins dusky; legs straw-yellow, apical halves of femora with two rows of spots and a line above and below, tibiæ with knees, spines and spot at base of each spine, black, tarsi fuscous; under surface black, shining, pale pubescent. Joints 1 and

2 of antennæ brownish-black, 1 almost as long as width of vertex, 2 four times as long as 1; 3 and 4 dusky yellow, 3 two-thirds as long as 2, 4 slightly more than half the length of 3. Length, 4—4.5 mm.

Hennepin Co., Minn., Aug. 2 (*Minn. Univ. Coll.*). Recorded from Massachusetts, New York and Minnesota. Occurs on the low birch, *Betula pumila* L. A form with femora black, tips pale and corium wholly brownish-black is var. *fuscatulus* Knight.

1094 (—). *PSALLUS WALDENI* Knight, 1923, 468.

Oblong, suboval. Fuscous-brown, pronotum and elytra clothed with erect pubescent hairs, intermixed with appressed paler ones; membrane pale fuscous, veins paler; legs yellowish to fuscous-brown, femora with dark spots as in key; tibiæ with two rows of prominent black spines, each with a large black spot at base; tarsi fuscous; ventrals black. Joints 1 and 2 of antennæ black, finely pale pubescent, 1 scarcely one-half as long as width of vertex, 2 four times as long as 1; 3 and 4 fuscous-brown, 3 two-thirds as long as 2, 4 two-thirds the length of 3. Beak reaching middle of hind coxæ. Length, 2.5 mm.

New Haven, Conn., May 30 (*Walden*). Known only from there.

1095 (—). *PSALLUS PICEICOLA* Knight, 1923, 469.

Oblong, sides subparallel. Head and pronotum brownish-black, elytra fuscous-brown, pubescence yellowish; base of cuneus and tip of embolium pale translucent, remainder of cuneus reddish-brown; membrane pale fuscous, paler at middle and near tip of cuneus, veins tinged with reddish; legs as in key; ventrals brownish-black tinged with reddish, pale pubescent. Joints 1 and 2 of antennæ dull yellow, 1 three-fifths as long as width of vertex, 2 three and one-third times as long as 1; 3 and 4 dusky, 3 three-fifths as long as 2, 4 slightly shorter than 3. Beak reaching first ventral. Head strongly vertical, subcompressed. Length, 2.8—3 mm.

Canby, Minn., June 24 (*Minn. Univ. Coll.*). Recorded only from New York and Minnesota. Breeds on spruce.

1096 (1243). *PSALLUS ANCORIFER* Fieber, 1858, 336.

Elongate-oval. Brownish-black to black, moderately shining, thickly clothed with yellowish appressed pubescence intermixed with suberect blackish hairs; elytra often brownish or brownish-yellow, cuneus sometimes reddish; color of legs as in key. Joint 1 of antennæ black, half as long as width of vertex; 2 slender, black, brownish apically, one-fourth longer than width of head across eyes; 3 and 4 dusky yellow, 3 three-fifths the length of 2, 4 two-fifths as long as 3. Beak reaching hind coxæ. Length, 3.8—4.2 mm.

Washington, D. C., June 19 (*Minn. Univ. Coll.*). Southern France (*British Mus. Coll.*). A European species ranging in this

country from New England west to New York and southwest to District of Columbia. Recorded also from California. Occurs on apple and alder.

1097 (—). *PSALLUS DRAKEI* Knight, 1923, 464.

Elongate, sides feebly curved. Black, strongly shining; clothed with the usual two types of pubescence; membrane and veins fuscous, a small hyaline spot near tip of cuneus; color of legs as in key; ventrals black, strongly shining, silvery-pubescent on sides. Antennæ black, joint 1 five-eighths as long as width of vertex, 2 four times as long as 1, 3 three-fifths the length of 2, 4 two-thirds as long as 3. Beak reaching between hind coxæ. Length, 4—4.4 mm.

Recorded from the Cranberry Lake region of New York and Nordegg, Alberta.

XII. *CYLLOCEPS* Uhler, 1893, 711.

Elongate-elliptical or subparallel. Head short, vertical, tylus projecting a little in front of eyes, vertex convex, not margined at base; beak reaching behind middle coxæ; pronotum trapezoidal, almost flat, sides with a calloused margin, calli large, almost contiguous, hind margin feebly sinuate; scutellum equilateral, convex; elytra entire, much surpassing abdomen, pale translucent; membrane almost as long as corium, joints 2 and 3 of tarsi subequal. One species occurs in Florida.

1098 (1268). *CYLLOCEPS PELLICIA* Uhler, 1893, 712.

Pale brownish-yellow, shining, minutely pubescent. Head yellow, median line and tylus black; pronotum dull yellow, tinged with brownish toward base; scutellum dark brown; elytra pale translucent, inner margins of clavus and corium fuscous, vein at base of membrane piceous; membrane pale fuscous, veins brownish; legs pale yellow, femora dusky at base, tips piceous; ventrals yellow, dusky at middle, orange red on sides; genital segments piceous. Joint 1 of antennæ black, its base and apex yellowish; remainder dusky yellowish, joint 2 four times as long as 1, 3 three-fourths as long as 2. Pronotum finely scabrous, transversely wrinkled, sparsely and finely punctate. Scutellum with a vague median carina. Length, 3 mm.

A neotropical species described from Cuba and St. Vincent and recorded from Biscayne Bay, Fla.

XIII. *CRIOCORIS* Fieber, 1858, 319.

Oblong-oval, subopaque black species having the head pointed, declivent, distinctly prolonged in front of base of antennæ, inserted in thorax to eyes, vertex convex, not margined; beak reaching middle coxæ; pronotum trapezoidal, sides feebly

concave at middle, base truncate, two-thirds wider than apex, disk feebly convex, calli small, rounded, not contiguous; mesoscutum almost concealed; scutellum small, almost flat; elytra entire, surpassing abdomen, cuneus large, feebly deflected; upper surface clothed with conspicuous deciduous appressed whitish scale-like hairs, intermixed with fine suberect black ones. One species occurs in the eastern states.

1099 (1223). *CRIOCORIS SALIENS* (Reuter), 1876, 88.

Oblong-oval, broader in female. Head, pronotum and scutellum black, feebly shining; elytra fuscous-black, subopaque; membrane fusco-



Fig. 191, Male X 11. (Original).

translucent, with a white dash near apex of cuneus; legs fuscous-brown, apical two-thirds of tibiæ and basal half of tarsi dull yellow, the spines black. Female with joint 1 of antennæ blackish-brown, three-fourths as long as width of vertex; 2 yellow, base blackish, apex dusky, much more slender than 1, as long as pronotum; 3 fuscous, paler at base, three-fifths as long as 2; 4 fuscous, scarcely one-third as long as 3. Male with joints 1 and 2 fuscous-brown, 1 clavate, 2 subfusiform, concave on outer side, thickly pilose, much thicker and nearly four times longer than 1; 3 and 4 much thinner, dusky yellow, 4 two-fifths the length of 3. Length, 2.7—3 mm. (Fig. 191).

Marion Co., Ind., May 19—June 6; swept from low herbage along the densely wooded banks of streams. Ottawa, Ont., June 29 (*Van Duzee*). Recorded from Quebec, Ontario, New Jersey, New York, Texas and California. The *C. canadensis* Van D. (1912a, 511) is a synonym, differing only in the largely pale second antennal of female.

XIV. *EXCENTRICUS* Reuter, I, 1878, 89.

Small oval, pubescent species having the head triangular, as broad across eyes as long, its front declivent; vertex not carinate; eyes large, contiguous to pronotum, but slightly overlapping its front angles; pronotum short, subtrapezoidal, its sides declivent, humeral angles rounded, hind margin broadly concave, disk smooth, calli obsolete; mesoscutum narrowly exposed; scutellum broad, triangular, equilateral; elytra entire, widened behind, surpassing abdomen; cuneus strongly de-

flected, its fracture deep; joints 2 and 3 of hind tarsi subequal, 1 shorter. Two species are known from North America, one occurring in Florida.

1100 (—). *EXCENTRICUS MEXICANUS* Van Duzee, 1923b, 163.

Oval, widest behind middle. Head, pronotum and scutellum fuscous-brown, shining, elytra slightly paler; cuneus brown, its tip and basal lunule yellowish; membrane fuscous, veins yellowish, a pale hyaline spot on apical half and another on inner margin of cell; femora brown, tibiæ dull yellow, spines very slender, pale brown, third tarsal and claws brownish; under surface blackish-brown, shining. Joints 1 and 2 of antennæ brown, strongly swollen; 1 subclavate, three-fifths as long as width of vertex; 2 cylindrical, twice as long as 1; 3 and 4 much more slender, 3 yellowish, two-thirds as long as 2, 4 dusky, one-half the length of 3. Upper surface thinly clothed with suberect dusky hairs and appressed deciduous whitish ones. Length, 2.5 mm.

Dunedin, Fla., April 7; swept from flowers of farkleberry, *Batodrendon arborcum* (Marsh.). Recorded heretofore only from Lower California.

XV. RHINACLOA Reuter, 1876, 88.

Head transverse, its front vertical, but slightly produced in front of antennæ; eyes large, coarsely granulated, in male occupying the whole of sides of head; beak not passing middle coxæ; pronotum short, base truncate, much wider than apex, sides straight, disk feebly declivent forwards; elytra entire, much surpassing abdomen; cuneus short, its fracture deep. One species occurs in Florida, another in the southwestern states.

1101 (—). *RHINACLOA SUBPALLICORNIS* Knight, 1926a, 225.

Oblong-oval. Head, pronotum and scutellum fuscous-brown, both they and elytra thickly clothed with deciduous silvery scale-like hairs, intermixed with dark suberect ones; elytra brownish-yellow, subtranslucent, inner half of corium often fuscous-brown; embolium dull yellow, its apical third and disk of cuneus usually red; membrane fuscous-brown, in fresh specimens clothed with silvery scales, veins reddish; femora brown, more or less tinged with fuscous, their tips paler; tibiæ yellowish with spines and spots at their base black; under surface fuscous-brown, clothed with silvery hairs. Joint 1 of antennæ dark brown, one-half as long as width of vertex, male, two-fifths as long, female; 2 cylindrical, male, subclavate, female, dull yellow, apical third blackish, four and a half times as long as 1, male, one-fourth shorter, female; 3 and 4 dusky yellow, 3 slender, cylindrical, three-fifths as long as 2, 4 fusiform, one-half the length of 3. Length, 2—2.5 mm.

Frequent throughout the southern third of Florida, Dec. 4—April 5. Occurs on ferns in dense hammocks and on herbage along the roadsides. Recorded also by Barber as *R. forticornis* Reut., a Texas species, from Biscayne Bay, Fla.

XVI. ATRACTOTOMUS Fieber, 1858, 317.

Small oblong-oval species having the body sparsely clothed with whitish or yellowish appressed scale-like hairs, intermixed with fine, suberect darker ones; head transverse, its front subvertical, not produced in front of eyes, tylus narrow, compressed; beak reaching or surpassing hind coxæ; pronotum with base truncate, much wider than apex, sides straight, disk inclined toward apex; elytra entire, surpassing abdomen, cuneus short, its fracture often deep; hind femora swollen, tibiæ with black spines. Two introduced European species and one variety occur in our territory.

KEY TO EASTERN SPECIES OF ATRACTOTOMUS.

- a.* Joint 2 of antennæ swollen, subequal in thickness in both sexes; front margin of pronotum and base of head clothed with prominent suberect pale yellowish hairs; host plant, apple. 1102. MALI.
- aa.* Joint 2 of antennæ rather slender in male, strongly swollen in female; pronotum and head without pubescence as in *a.*
- b.* Second antennal distinctly longer than width of head; larger, length 3—3.5 mm.; host plant, pine. 1103. MAGNICORNIS.
- bb.* Second antennal in female subequal in length to width of head; smaller, length 2.5 mm.; host plant, hemlock.

1103a. var. BUENOI.

1102 (—). ATRACTOTOMUS MALI (Meyer), 1843, 63.

Dark brown or black, the two types of pubescence conspicuous; membrane dark fuscous, veins and a small spot near tip of cuneus paler; legs brown or black, tibiæ paler toward apex, their tips and those of tarsi blackish. Joints 1 and 2 of antennæ black or dark brown, 1 clavate, two-thirds as long as width of vertex, 2 strongly swollen, subfusiform, thickly clothed with stiff forward-inclined hairs, three and one-half times as long as 1; 3 and 4 dusky yellow, very slender, united as long as 2, 4 one-half the length of 3. Length, 3.2—3.5 mm.

Theydon Bois, England, July (*British Mus. Coll.*). Recorded by Knight (1924, 65) from Wolfville, Nova Scotia, where it was predaceous on a green apple aphid.

1103 (—). ATRACTOTOMUS MAGNICORNIS (Fallen), 1807, 99.

Elongate, subparallel, male, suboval, female. Head, pronotum and scutellum black or dark brown; clavus and corium usually chestnut-brown or tinged with reddish, cuneus often dark brown; membrane pale fuscous, veins yellowish, cells brownish; femora fuscous-brown to black; tibiæ yellowish-white to brownish with minute darker spots at base of

spines; tips of tarsi and claws blackish. Joints 1 and 2 of antennæ dark brown or black, thickly clothed with short, stiff black hairs; 1 nearly three-fifths as long as width of vertex; 2 as in *aa* of key, four and two-third times the length of 1; 3 and 4 filiform, dusky yellow, 3 nearly three-fifths as long as 2, 4 four-fifths the length of 3. Beak reaching first ventral. Length, 3 mm.

Hollington and New Forest, England, August (*British Mus. Coll.*). A European species recorded in this country only from Ithaca, N. Y., where it was found on *Pinus sylvestris* L.

1103a (—). *ATRACOTOMUS MAGNICORNIS* BUENOI Knight, 1923, 461.

Smaller and more ovate than *magnicornis*. Color fusco-blackish, not tinged with reddish as there; membrane uniformly fuscous; legs blackish, tibiae slightly paler; ventrals blackish, dusky-pubescent. Joint 2 of antennæ in female shorter, only four times the length of 1; in male longer, five times the length of 1. Length, 2.5 mm.

White Plains, N. Y., June 25 (*Minn. Univ. Coll.*). Known only from there, where it was taken on hemlock and spruce by Bueno.

Family XXX. HYDROMETRIDÆ Billberg, 1820, 67.

THE MARSH-TREADERS.

Extremely slender bugs having the body linear, subcylindrical; head much longer than pronotum, porrect; eyes large, placed slightly behind its middle; antennæ 4-jointed, filiform, inserted on the sides of the enlarged front of head; ocelli absent; beak 3-jointed, very slender, shorter than head, inserted between the ends of the deflexed cheeks; pro- and mesonota subequal in length, slightly wider than head, their sides parallel; elytra usually absent, when present, elongate, linear, reaching fifth or sixth dorsal; legs elongate, very slender; tarsi 3-jointed, their claws apical.

The family is represented by a single genus comprising fewer than a dozen described species. They live among the weeds and grasses growing in stagnant water or on the near-by mud or muck flats, and feed mainly upon minute living forms of aquatic life. They walk slowly about over the surface film of water, and when disturbed attempt to conceal themselves among the fallen and tangled vegetation rather than by flight or quick movement. The principal literature treating of our species is by Say, 1832; Uhler, 1884; Martin, 1900; Bueno, 1905, and Hungerford, 1920, 1923.

I. HYDROMETRA Lamarck, 1801, 295.

Our species of this genus, characterized as above, have the head widened near tip, narrower in front of eyes; joint 1 of antennæ surpassing the blunt-tipped tylus by half its length, 2 and 4 subequal, each about half the length of 3; pronotum elongate-oblong, somewhat narrowed in front; elytra, when present, long, narrow, gradually slightly widening behind, their tips rounded, disk with two long veins and two cross nervures enclosing a single irregular cell on apical half; abdomen reflexed above, convex beneath, its margins parallel, male, moderately broadly curved, female. Three species are known from this country, two occurring in our territory. The males of these are easily separated, the females more difficult.

KEY TO EASTERN SPECIES OF HYDROMETRA.

- a. Pits on sides above middle coxæ two; head in front of eyes 1.3—1.5 mm. in length; male with under side of sixth ventral with two transverse concave subbasal elevations and last dorsal with a distinct spinous projection. 1104. MARTINI.
- aa. Pits on sides above middle coxæ four; head in front of eyes 1.8—2 mm. in length; male with under side of sixth ventral with two conical tubercles and last dorsal prolonged as a tubercle. 1105. AUSTRALIS.

1104 (1281). HYDROMETRA MARTINI Kirkaldy, 1900, 175.

Dark chestnut- or fuscous-brown, often with a bluish tinge; elytra dusky whitish with dark nervures; pronotum with a vague median longitudinal whitish line; antennæ reddish-brown, darker toward apex; beak, legs, under surface and middle of dorsum brownish-yellow; apical halves of tibiæ and tarsi more or less fuscous. Apical third of head less widened than in *australis*. Elytra, macropterous form, reaching sixth dorsal, male; fifth dorsal, female. Length, 8—11 mm. (Fig. 192).

Marion and Lawrence counties, Ind., April 11—May 11. Ft. Myers, Kissimmee, R. P. Park and Dunedin, Fla., Nov. 24—April 23 (*W. S. B.*). Sherborn, Mass., Aug. 30 (*Frost*). Apparently scarce in Indiana, where it has been found only in or about ponds partially covered with duckweed (*Lemna*) in dense woodland. Common about Dunedin in ponds and ditches or beneath boards and other cover along their margins. When fresh from the last moult the young adult is usually covered with a slate-blue "bloom" which disappears in a few weeks. Although so slender in form, the adults are often attacked by a red mite. But two of the 25 specimens at hand are macropterous. The known range of *H. martini* extends from Ontario

and New England west to Michigan, Illinois and Kansas, and south and southwest to Florida, Louisiana and Texas. This species is the *H. lineata* of Say (I, 361) and most of the records have been under his name, which was preoccupied. Martin

(1900, 70) and Bueno (1905, 12) have given excellent accounts of the habits and life history of this species. From the former I quote as follows:

"The appearance of this insect is unique and exceedingly grotesque for the body is so elongate and the legs so thin that it appears like a minute Indian club stalking about on the water. The economy of this elongate form becomes at once apparent on studying the habits of Hydrometra. In the first place it reduces the insect's weight⁹⁵ to the minimum and so lessens the liability of breaking through the treacherous surface film upon which the life of this aquatic pedestrian is passed. In the second place the long cylindrical body is so like a bit of twig in appearance that Hydrometra is protected from its enemies and concealed from its prey which do not in the least suspect

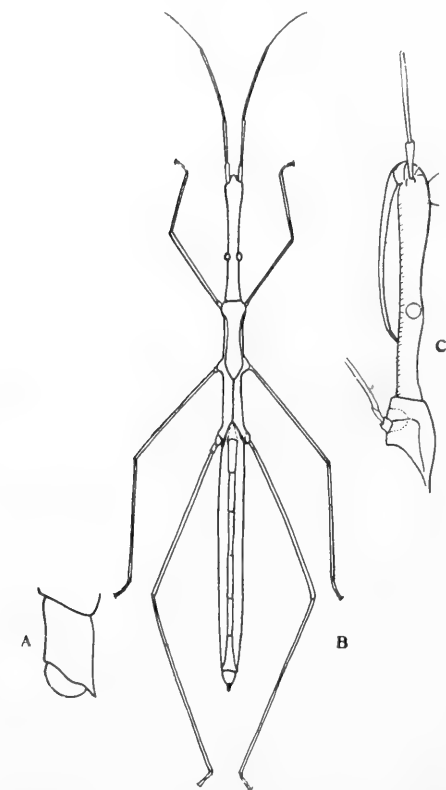


Fig. 192. *a*, Male genitalia; *b*, dorsal view of insect X 10; *c*, side view of head.
(After Garman, Hemiptera of Connecticut).

pect in this apparent straw the presence of a deadly foe.

"The peculiar habitat and elongate form have given rise in the male to a secondary sexual character which consists of two notched projections on the under side of the sixth abdominal segment. The object of these is to fit over the lateral keels of the female abdomen, thus steadying the abdomen of the male during copulation. This is rendered necessary not only by the elongate abdomen, but also because it is necessary for the insects to maintain their balance upon the water or run the risk of breaking through the surface film, an accident very likely to cause death by drowning. Hydrometra is a carnivorous insect, its food con-

⁹⁵The weight is not reduced, but is distributed over a wider area of the surface film. (W. S. B.).

sisting of the juices of insects that fall into the water and the number of these is considerable along the grassy aquatic borders. When such a hapless insect falls it is at once pounced upon by one or several of these voracious bugs, who insert their beaks and proceed to suck the juices from their still struggling victim. I have seen no less than ten thus surround their prey all with their heads in the direction of common interest and their bodies radiating outward."

1105 (1282). *HYDROMETRA AUSTRALIS* Say, 1832, 35; I, 361.

Differs from *martini* chiefly in characters given in key. General color darker, being more often a bluish-black. Front portion of head proportionally longer and more dilated towards tip. Last dorsal of male less swollen and bearing a short tubercle instead of a spine. Tip of abdomen of females less elongate than in *martini*. Length, 8—11 mm.

Dunedin, Fla., April 23; three specimens taken from a mass of decaying weeds on margin of Jerry Lake. Recorded from Jacksonville by Barber. Its known range extends from White Plains, N. Y., southwest to Georgia and Florida and west to Kansas and Louisiana. Appears to be much less common than *martini* though probably confused with it in many collections.

Superfamily GERROIDEÆ Reuter, 1912b, 15, 48.

This superfamily, as limited in the key, p. 34, comprises elongate, rather slender semi-aquatic species having the antennæ exposed, as long as or longer than head, the latter shorter than pronotum, including scutellum; beak 4-jointed; elytra usually dimorphic, when present largely membranous, the usual divisions not differentiated, the veins longitudinal, forming distinct cells; osteola present; last tarsal joint bifid at apex, its claws inserted on the side some distance above the tip (fig. 6, *n*).

The superfamily as thus characterized contains two families, both represented in our territory.

KEY TO FAMILIES OF GERROIDEÆ.

- a*. Hind femora much surpassing apex of abdomen; middle and hind coxæ approximate, distant from front ones.
Family XXXI. GERRIDÆ, p. 967.
- aa*. Hind femora but little if at all surpassing tip of abdomen; middle coxæ (except in *Rhagovelia*) equally distant from front and hind ones.
Family XXXII. VELIIDÆ, p. 987.

Family XXXI. GERRIDÆ Amyot & Serville, 1843, 410.

THE WHERRYMEN OR WATER STRIDERS.

This family comprises semi-aquatic Heteroptera of medium size having the body usually narrow, elongate, widest behind

pronotum, and covered with a short, dense water-proof velvety pile; head shorter than pro- and mesonota united, subconical, inserted in thorax to eyes; ocelli present, but usually very small and obscure; eyes large, rounded, prominent; antennæ short, rather stout, 4-jointed, inserted on sides of head usually some distance in front of eyes; beak stout, 4-jointed, joints 1 and 2 very short; scutellum and elytra usually absent, the latter, when present, without distinct clavus or membrane and usually reaching nearly to tip of abdomen; tarsi 2-jointed; legs very long and slender, femora, coxæ and tarsal claws as described in family key and under superfamily heading.

Our more common members of this family live upon, not in the pools of quiet waters of streams and ponds. They glide gracefully over these pools borne up by the surface film of the water which, though invisible to human eye, everywhere covers it like a membrane stretched equally in all directions. The wherry-men find this film a pavement well suited for their airy feet, as they skate merrily to and fro in search of living prey. When disturbed they often move so swiftly that they seem but darting lines as they circle round and round each other in a mystic dance. The under parts of the insect are densely covered with fine hairs which form a perfect water-proof vestment. The body is held just above the water by the six legs, each of which rests in a little saucer-shaped depression of the water-film. The hind legs, from the knee down, rest on the water, and the indentations formed by them are long oval in form, while those made by the front legs are circular in outline. The middle legs are longer than the others and the portion of them touching the water is smaller. The insect uses only these middle legs in propelling the body, moving them in a quick forward stroke like a pair of oars. It thus glides or skates on the front and hind legs, the disks which they form seemingly traveling with the insect. In early morn and late afternoon, when the rays of the sun strike the water at a certain angle, they are deflected by the disks, and the resting wherryman forms a most peculiar shadow. When in motion this is rendered more unique by the quick movement of the long propelling legs.

The adults hibernate beneath cover along the banks of streams and ponds, often at some distance from the water, but

reappear on the first warm days of spring. The eggs are soon after attached by a sort of glue to the leaves and stems of aquatic plants. They hatch in about two weeks, the young emerging from a slit which opens a little way down the side. There are commonly two forms of the adult belonging to the same species, the winged and unwinged. These do not necessarily coexist. During some years only the winged forms appear, while in others, if the spring and summer are cool, all will be unwinged. Often in sunny protected places where food is abundant, all will be winged.

The family is widely distributed, its members occurring in all parts of the world, 19 species, distributed among six genera, occurring in the eastern states. The principal literature treating of them is by Say, I, 362; Uhler, 1871, 1878; Champion, 1898; Kirkaldy, 1906; Bergroth, 1908; Bueno, 1911, 1915, 1917b, 1917c; Parshley, 1916; Riley, C. F., 1919, 1920, 1922, 1922a, and Hungerford, 1920.

KEY TO EASTERN GENERA OF GERRIDÆ.

- a. Inner margin of the eyes concave or sinuate behind the middle; body comparatively long and narrow, the abdomen long (Subfamily Gerrinæ).
- b. Pronotum sericeous, dull, in wingless forms fused with mesonotum; hind margins in winged form wide, obtusely rounded; basal joint of front tarsi but little shorter than apical one.
 - I. GERRIS, p. 970.
- bb. Pronotum glabrous, shining, in wingless form not fused with mesonotum; hind margin of latter in winged form narrowly rounded; basal joint of front tarsi much shorter than apical one.
 - II. LIMNOGONUS, p. 978.
- aa. Inner margin of eyes convexly rounded; body short and broad; pronotum in brachypterous form not fused with mesonotum; abdomen usually very short (Subfamily Halobatinæ).
- c. First antennal nearly or quite equal to the remaining three united, distinctly longer than 2 and 3 together; hind femora twice as long as hind tibiæ.
 - III. METROBATES, p. 980.
- cc. First antennal much shorter than the other three united, not much longer, sometimes shorter, than 2 and 3 together.
- d. Fourth antennal equal to or shorter than third; hind femora equal to or shorter than hind tibia and tarsus united; abdomen as long as remainder of body, strongly tapering toward apex.
 - IV. RHEUMATOBATES, p. 981.
- dd. Fourth antennal distinctly longer than third; abdomen much shorter than remainder of body.
- e. Color black and yellow; eyes large, fairly prominent; lacustrine species.
 - V. TREPOBATES, p. 985.

ee. Color leaden-gray, wholly sericeous; eyes small, widely separated; oceanic species.

VI. HALOBATES, p. 986.

I. GERRIS Fabricius, 1794, 187.

This genus comprises the largest and most familiar of our water striders. In addition to the characters given in key they have the body everywhere densely clothed with a short velvety pile; head stout, obtusely conical, its front portion moderately declivent; eyes very large, coarsely granulated; joint 1 of antennæ longer and usually stouter than any of the others; beak

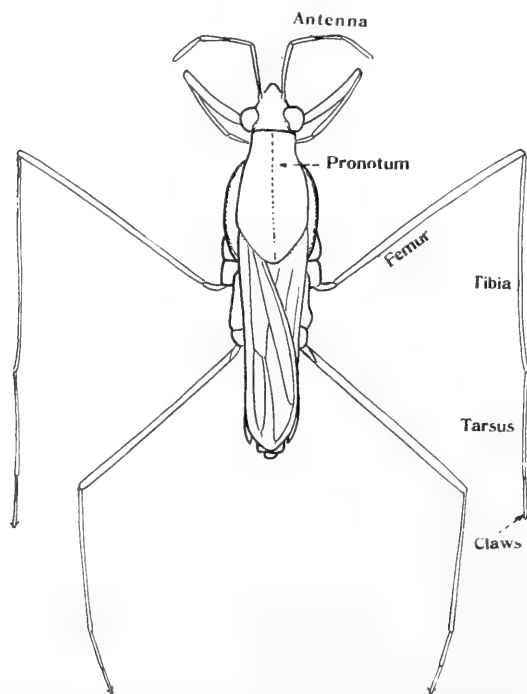


Fig. 193. *Gerris luteolus* Kirk., X 7. (After Garman in Hemiptera of Connecticut).

reaching onto mesosternum, the latter grooved; pro- and mesonota fused, the former much the shorter; elytra in winged forms reaching beyond middle, sometimes nearly to end of abdomen, without distinct membrane, the veins elevated and prominent; dorsum of abdomen concave, its sides strongly reflexed; apical angles of sixth ventral usually strongly prolonged backward; middle and hind legs much longer than front ones, their coxæ prominent, projecting outward beyond the sides,

the femora of hind ones much surpassing tip of abdomen. Eleven species have been recorded from our territory.

KEY TO EASTERN SPECIES OF GERRIS.

- a.* Joint 1 of antennæ distinctly longer than 2 and 3 united; larger, length 14 or more mm.
- b.* Pronotum without a median carina; under side of body dark; elytra usually absent; spines of sixth ventral not reaching apex of genital. 1106. REMIGIS.
- bb.* Hind lobe of pronotum with a distinct median carina; under side of body usually yellowish or silvery-gray; elytra always present though sometimes abbreviated; spines of sixth ventral slightly surpassing apex of genital.
- c.* Hind margin of sixth ventral of male broadly and shallowly concave. 1107. CONFORMIS.
- cc.* Hind margin of sixth ventral of male deeply and roundly concave. 1108. NEBULARIS.
- aa.* Joint 1 of antennæ not or but slightly longer than 2 and 3 united; smaller, length usually less than 11 mm.
- d.* Antennæ less than half the length of body, not extending beyond the pronotum; sixth ventral of male with hind margin usually sinuate or doubly concave, its spines rather short and stout, at most passing but little the middle of genital plate; under surface usually blackish.
- e.* Side margins of front lobe of pronotum concolorous with the disk.
- f.* First ventral genital segment of male without a tuft of long hairs each side.
- g.* First joint of antennæ only about one-sixth longer than fourth; spines of sixth ventral of female reaching to or beyond middle of genital plate.
- h.* Male with median notch of hind margin of last ventral narrowly rounded (fig. 194, *b*); first genital less convex and with a median keel. 1109. MARGINATUS.
- hh.* Male with median notch of last ventral deeply and roundly notched; first genital very convex and without a keel. 1110. INSUPERATUS.
- gg.* First antennal one-fourth or more longer than fourth; spines of sixth ventral short, obtuse, not reaching middle of genital plate; abdomen in great part usually dull yellow. 1111. ALACRIS.
- ff.* First ventral genital of male with sides deeply depressed and with a tuft of long hairs in each depression. 1112. COMATUS.
- ee.* Side margins of front lobe of pronotum with a pale stripe.
- i.* Bases of elytra wholly dark; second or median emargination of sixth ventral of male broadly rectangular (fig. 194, *c*). 1113. BUENOI.
- ii.* Inner basal margins of elytra marked with yellowish-white lines between the veins; median emargination of sixth ventral of male semicircular (fig. 194, *a*). 1114. ARGENTICOLLIS.

dd. Antennæ half or more the length of body, reaching at least to second dorsal; sixth ventral of male with a single broadly rounded concavity, its spines long, slender, acute, reaching to or slightly beyond apex of genital; under surface of body in great part pale.

j. Front lobe of pronotum without a distinct black spot each side of a pale median line; length less than 11 mm.

1115. CANALICULATUS.

jj. Front lobe of pronotum with a distinct black spot each side of a paler median line; length, 13 or more mm.

1116. RUFOSCUTELLATUS.



Fig. 194. VENTRAL VIEWS OF MALE GENITALIA OF GERRIS. a, *G. argenticollis* Parsh.; b, *G. marginatus* Say; c, *G. buenoi* Kirk. (After Parshley).

1106 (1283). GERRIS REMIGIS Say, 1832, 35; I, 362.

Elongate-oval, rather stout-bodied. Above dark brown, the pronotum sometimes in part reddish-brown, reflexed sides of abdomen reddish-brown, the incisures slightly paler; base of beak, prosternum, coxæ and middle and hind femora dull brownish-yellow; remainder of lower surface, antennæ, tibiæ and tarsi pale to dark brown, the sides of pleura usually clothed with a very fine silvery-gray pubescence. Joint 1 of antennæ nearly as long as 2—4 united, these subequal in length. Disk of front lobe of pronotum concave at base; hind one three times as long, finely transversely rugose, its hind portion regularly rounded without depressed sides as in *marginatus*. Hind margin of sixth ventral of male with a rounded median concavity, its spines short and stout reaching nearly to tip of first genital. Length, 14—16 mm.

Common throughout Indiana; occurring probably on every pond and lake and on the quiet pools of all streams. Hibernates beneath logs and rubbish near their banks and sometimes seen on the water on warm days in February. Ranges from Labrador across the continent to the Pacific and south to Georgia, Texas, Mexico and Central America. Not as yet recorded from Florida, but probably occurs in its northern counties. In Indiana this wherryman abounds on the shaded pools of the smaller streams, and in times of summer and autumn drouths it collects by scores beneath flat rocks and other cover in their beds. There they remain until the water of the stream is replenished. If not too far distant some in time find their way to other pools, but if the drought is of long duration many

doubtless perish. C. F. C. Riley (1919, 1920, 1922 and 1922a) and Bueno (1917b) have published interesting accounts of the habits of *G. remigis* and *G. marginatus*. The former states that in captivity both species feed normally upon various species of insects, but when hungry are not particular as to the character of their food, eating the soft parts of bananas, snails and even one another. From Bueno I quote as follows:

"Of all the bugs I know I can think of none so amorous as our common large water-strider, *Gerris remigis* Say. From the earliest days of spring, when the Frost King releases the waters from his bondage, till the cloudy days of autumn, when the leaves fall and the winds grow bleak at his return, these beasties are common and familiar sights to the lover of the quiet flowing waters running to the distant seas. In these haunts in some still little bay or moveless backwater, under a bridge, or in the shadow of a tree, or in the cool recesses of an overhanging bank, you may see *remigis* gathered in numbers, rowing silently about, now and again skipping to escape the maw of some greedy fish, or pouncing on some unfortunate insect fallen into the water and struggling to escape from the clutches of that deadly element. Here they rear large families and spend at ease the sultry dog-days. When winter comes again the old generation have passed away and their young descendants, now full grown, seek shelter against frost and snow under nearby logs or stones on the banks, or crevices in them; there to sleep until in the round of days Old Sol routs the chills of winter and spring once more ushers in the leaves and flowers, and vivifies all the reproductive powers of nature, in which *Gerris* is not the least factor.

"In nature the life history of *Gerris remigis* appears to be briefly this: Breeding and oviposition begin as early as February, or in the first warm days of spring. It is seemingly continuous all through the summer, and it is not unusual to find nymphs in various stages in company with the adults. The mother lays her cylindrical pearly eggs end to end along the edges of grasses or other vegetation growing into the water, to which she attaches them by means of a colorless waterproof glue. Here they develop more or less quickly, according to the temperature, the little bugs showing day by day more plainly through the shell. At the end of a week or ten days they burst the shell and escape into the water. In time, some six days or so, they cast their skins with accompanying changes in structure. This takes place four times more before they reach the perfect insect at the end of about six weeks. It is thus possible for *G. remigis* to have at least three generations in a summer, if not more, depending, of course, on the length and temperature of the season.

"*Gerris remigis* is parasitized by a bright red water mite, which attacks it in all stages of development. I have found in midsummer an individual with head completely covered with these larval mites, excepting the eyes and beak; a winged specimen had the thorax invaded. Polymorphism is not displayed by this species, which is only dimorphic, being

found, but very rarely, fully winged, its common form being apterous. The possession of wings always causes a change in the structure of the thorax to accommodate the much enlarged muscles which the use of organs of flight requires. These winged adults are generally found solitary in the most unlikely places—isolated little pools, springs, rock-holes, beach drift, far from the favorite haunts of this stream-loving bug."

1107 (1285). *GERRIS CONFORMIS* Uhler, 1878, 435.

Elongate, subparallel, more slender than *remigis*. Above a nearly uniform fuscous-black; pronotum with a vague median line on front lobe, the narrow lateral edge, sometimes the tip of hind lobe, and the narrow edge of connexivum, dull yellow; under surface yellowish- or fuscous-brown, usually thickly clothed with a very fine dense silvery-gray pubescence; prosternum, coxæ and genital plates dull yellow. Antennæ as in *remigis* the joints more slender. Pronotum wider, with side margins of basal third more oblique and hind margin more narrowly rounded; disk of hind lobe densely punctate and with a distinct but low median carina and a small glabrous nodule each side behind middle. Elytra entire, reaching middle of sixth dorsal. Legs extremely long and slender, the middle and hind femora longer than body. Sixth ventral of male very broadly and shallowly concave. Length, 15—17 mm.

Tuckerton, Pa., July (*Gerhard*). Charlotte and Swannanoa, N. Car., April—June (*Brimley*). Ranges from New England west to Ohio and southwest in the coastwise states to North Carolina. Bueno (1908a, 233) says that "it is very rare in the north, but farther south, in the Carolinas, appears to be nearly as common as *remigis* is with us."

1108 (—). *GERRIS NEBULARIS* Drake & Hottes, 1925a, 70.

Differs from *conformis* mainly by the character given in *cc* of key; color and proportional length of antennals the same. Elytra in long-winged form reaching base of first genital; in short-winged one only to middle of second or third dorsal. Genital segments of male distinctly broader than in *conformis*, the median ridge long and prominent with a large, strongly depressed area each side. Length, 15.4—16 mm.

Waltonville, Ill., July 20 (*Ill. Nat. Hist. Surv. Coll.*). Its recorded range extends from New Jersey west to Illinois and south to Gainesville, Fla.

1109 (1288). *GERRIS MARGINATUS* Say, 1832, 36; I, 362.

Elongate, sides subparallel. Above dark reddish- or fuscous-brown, thickly clothed with a fine yellowish pubescence; median line of front lobe and narrow edge of hind lobe of pronotum and margins of abdomen dull yellow; antennæ and legs reddish-brown, the front femora darker; prosternum, coxæ and genital plates yellow. Antennæ short, stout, joint 1 but little longer than 4, 2 and 3 much shorter, subequal. Disk of hind lobe of pronotum with a distinct median carina, the sides with a nodule

near middle behind which they are widely depressed. Elytra usually entire, almost reaching tip of abdomen. Other characters as in key. Length, 9—11 mm.

Common in Indiana, especially so on the lakes of the northern counties. Occurs throughout the year, hibernating beneath logs and other cover, usually close to water, but occasionally taken in winter and in times of drought on woodland slopes a mile or more distant from any stream. Ranges from Quebec and New England west to the Pacific and south to North Carolina, Georgia and Texas. It is apparently more at home on ponds and in the bays of lakes than on streams, but is usually common wherever found. The elytra are rarely absent, but occasionally reach only to middle of abdomen. When kept in captivity by Riley, its feeding habits were the same as those of *remigis* but, being a much smaller form, it was more hesitant about attacking the larger living insects which were furnished them. He also has recorded (1922) that *marginatus* practices cannibalism during periods of stress or of great scarcity of food, as in severe drought.

1110 (—). *GERRIS INSPERATUS* Drake & Hottes, 1925a, 71.

"Very similar to *marginatus*. Color markings, form and size the same. Connexiva, except outer margins, and median portion and posterior margin of last ventral, golden yellow; median stripe of venter varying from golden yellow to brown. Macropterous form only known. The notch of the last segment of venter and plump genital segments without a keel distinguish the males from those of *marginatus*. The females of the two are hard to separate. Length, 7.4—8.6 mm."

Knox Co., Ind., July 5 (*W. S. B.*). Homer, Ill., April 27 (*Ill. Nat. Hist. Surv. Coll.*). Ranges from Ottawa, Ontario, and New York west to Ohio and Illinois and south to Mexico.

1111 (—). *GERRIS ALACRIS* Hussey, 1921, 11.

In addition to characters mentioned in key, this form differs from *marginatus* in having the abdomen dull yellow margined with blackish, or rarely wholly blackish; median carina of pronotum less evident; elytra usually abbreviated, reaching middle of third dorsal. Male with sides of median emargination of sixth ventral somewhat more parallel; female with genital segment more narrowed apically and spines of sixth ventral more blunt. Length, 7—10 mm.

Clark Junction, Lake Co., Ind., July 4 (*Gerhard*). The types were from a small pond at the foot of a sand dune on the shore of Lake Michigan in Berrien Co., Mich., and it is known only from similar ponds in the dune region and at Ann Arbor.

1112 (—). *GERRIS COMATUS* Drake & Hottes, 1925, 48.

Color of body, legs and antennæ as in *marginatus*. Elytra always present but variable, reaching to first dorsal genital, or only to fifth dorsal. Male with sixth dorsal deeply, broadly and roundly emarginate and ending in very short spines. Ventrals of male indistinctly carinate, 3—6 somewhat depressed, hind margin of 6 deeply and roundly excavated. Sixth ventral of female with terminal spines slightly shorter and more obtuse, and clothed with longer hairs. Length, 7.3—8.2 mm.

Ames, Iowa, July 24 (*Ill. Nat. Hist. Surv. Coll.*). The recorded range extends from Maine and New Jersey west to Wisconsin, Colorado and Wyoming.

1113 (1289). *GERRIS BUENOI* Kirkaldy, 1911, 246.

Oblong, narrower behind, robust for the genus. Above dull fuscous-black; a short median line on front lobe and narrow marginal one on both front and hind lobes of pronotum and margin of connexivum both above and beneath, dull yellow; antennæ, tibiæ and tarsi brown, their terminal portions darker; prosternum, coxæ, sixth ventral, genitals, and femora in great part, dull yellow, the front femora blackish above and on sides. Joint 1 of antennæ subequal in length to 2 and 3 united, 3 shortest, 4 two-thirds the length of 1. Disk of pronotum finely and densely punctate, the hind lobe with median carina evident, but feeble; hind margin rather narrowly rounded. Elytra usually present, reaching tip of abdomen. Hind tibiæ and tarsi united scarcely as long as femur. Other characters as in key. Length, 7—8 mm. (Fig. 193).

Staten Island, N. Y., July (*Davis*). South Chicago and Worth, Ill., Sept. 14—Oct. 9 (*Gerhard*). Attleboro, Mass., mating June 21 (*Frost*). Ranges from Quebec and New England west to British Columbia and Colorado. Not recorded south of New Jersey. Drake (1923, 80) mentions it as by far the most abundant species of the smaller forms of *Gerris* found about Cranberry Lake, N. Y., its habits and haunts being quite similar to those of *G. marginatus*.

1114 (1288½). *GERRIS ARGENTICOLLIS* Parshley, 1916, 103.

Form and size of *G. marginatus*. Color much the same, the side margins of front lobe of pronotum with a yellow stripe which is clothed with thick silvery pubescence; inner margins of basal third of elytra usually marked with dull white or yellowish between the veins. Joint 1 of antennæ slightly longer than 2 and 3 united, 4 about two-thirds the length of 1. Pronotum as in *marginatus*, the side margins of posterior third of hind lobe wider and more depressed in both than in *buenoi*. Length, 7.5—8.5 mm.

Staten Island, N. Y., April (*Davis*). Forest Hills, Mass. (*Barber*). Chicago, Ill., April 30 (*Gerhard*). Ranges from New England west to Michigan and Illinois and southwest to Mis-

issippi. Very close to *marginatus*, but distinguished by the pale marking at base of elytra, the silvery edge of front lobe of pronotum and the narrower median emargination of male genital. Not taken but doubtless occurs in northern Indiana, as in Berrien Co., Mich., Hussey found it: "The most abundant *Gerris*, with the possible exception of *G. remigis*, on all the woodland pools."

1115 (1290). *GERRIS CANALICULATUS* Say, 1832, 36; I, 363.

Elongate, slender, subparallel. Above dark chestnut-brown; front lobe of pronotum with median line and narrow edge of side margins dull yellow; antennæ reddish-brown, darker toward tips, the incisures pale; beak, legs and under surface pale brownish-yellow, often with a dusky tinge, the tarsi and tip of beak darker. Antennæ and middle and hind legs very slender, the former with joints 1 and 4 subequal in length, 2 and 3 also subequal, each about three-fifths the length of 1. Pronotum elongate, narrow, its median carina evident but feeble; disk granulate-punctate with hind margin narrowly rounded. Elytra usually entire, reaching almost to tip of abdomen. Median groove of under surface extending onto metasternum. Length, 9.5–10.5 mm.

Dunedin, Fla., Nov. 23—March 2; a dozen or more specimens taken from a small pond in the pine woods and a ditch in dense hammock; both adults and nymphs on the former date. Raleigh, N. Car., March—November (*Brimley*). Staten Island, N. Y., Aug. 19 (*Davis*). Recorded from Florida heretofore only from St. Augustine, Titusville and Daytona in the northern third of the State. Ranges from New England and New York west to Ohio and southwest to Georgia and Florida. It is the most slender-bodied of the genus, easily known by the pale under surface with long median groove, and long acute spines of sixth ventral. Bueno says that in New England it frequents secluded little coves and bays of ponds. In his key (1923, 659) he places this species with those having the antennæ "not extending beyond the thorax," whereas they reach to or beyond the second dorsal. The three Staten Island specimens at hand are wingless.

1116 (1291). *GERRIS RUFOSCUTELLATUS* Latreille, 1807, 134.

Elongate, sides subparallel. Head and front lobe of pronotum in great part fuscous-black; remainder of upper surface, antennæ, beak and middle and hind tibiæ and tarsi, russet-brown; front legs, prosternum, coxæ and middle and hind femora, pale brownish-yellow; sides of meso- and metasterna blackish, with a silvery-gray lustre; abdomen dull yellow with interrupted brownish stripes. Joint 1 of antennæ about as long as 2 and 3 united, 2 and 4 subequal, 3 slightly shorter. Disk of pronotum

with a low but distinct entire median carina, its sides feebly but evidently diverging from apex to the nodulose humeral angles; thence strongly converging and feebly reflexed to the narrowly rounded base. Elytra reaching apex of sixth dorsal, rarely absent. Under surface with median groove reaching metasternum. Length, 12—15 mm.

Common on the smaller lakes of northern Indiana and in the beach drift of Lake Michigan; not taken in the southern portion (*W. S. B.*). Yaphank, N. Y., July 16 (*Davis*). It is a palæarctic species occurring in northern Europe and Asia, and in this country ranging from Quebec and New England west to British Columbia and California and southwest to the mountains of North Carolina. It is found on the still waters of ponds, lakes and ditches, especially those in mountainous regions. Drake states that it is very common about Cranberry Lake, N. Y., where it is among the first of the water striders to appear in early spring. The eggs are deposited just beneath the surface film of the water upon floating leaves of aquatic plants, small sticks and other objects in the water. Bueno (1913, 109) regards *G. rufoscutellatus* as:

“Without a doubt the Hemipteron of widest actual distribution next to *Nezara viridula* (L.). It is known across northern Europe through Siberia, thence to British Columbia and Oregon, ranging east to the Northern Atlantic region. Here we have a form undeniably palæarctic in origin, which has migrated from its native source and travelled 15,000 miles to found its colonies throughout the North Temperate Zone. Its route has certainly been via Bering Straits into Alaska and thence east and south. Its habitat and its predaceous nature have both contributed largely to its fitness for this long voyage. It is furnished with good wings, sucks any insect it can overcome and lives on the surface of the water. It has therefore had an unimpeded and favorable route from the land of its nativity eastward until stopped at the impassable barrier of the Atlantic ocean.”

II. LIMNOGONUS Stal, 1868, 132 (*Tenagogonus* Stal).

Our members of this genus differ from *Gerris* mainly by the characters given in the generic key, and form a sort of connecting link between that genus and the others of the family. In the wingless forms they have the antennæ long and slender, about reaching hind coxæ; eyes very feebly concave within; pronotum with disk semicircular, much shorter than mesonotum, the latter oval with hind margin broadly rounded; abdomen shorter than remainder of body, its side margins above flattened near base, obtusely carinate and inflexed toward apex;

front legs stout, feebly curved, their tibiae slightly longer than femora and basal joint of tarsus only half the length of apical one; middle and hind legs long and slender, the latter with femur about one-fourth longer than tibia and tarsus united. In the winged form the pronotum is subquadrate, fused with mesonotum, the latter much as in *Gerris*, but more narrowly rounded behind; elytra narrowed behind, surpassing abdomen. Two species occur in our territory.

KEY TO EASTERN SPECIES OF LIMNOGONUS.

- a.* Head with two yellow lines united behind; joint 1 of antennae but little longer than 3. 1117. *HYALINUS*.
aaa. Head without yellow lines; joint 1 of antennae slightly longer than 2 and 3 united. 1118. *HESIONE*.

1117 (1292). *LIMNOGONUS HYALINUS* (Fabricius), 1803, 258.

Head shining black with pale lines as in key; pronotum black, its side and hind margins narrowly, two short lines and a narrow median one on front lobe, dull yellow; elytra blackish-brown, their inner half a paler brown; body beneath ochraceous, densely clothed with silvery pubescence, pleura and ventrals with a black line each side; legs brownish, front femora paler at base. Antennae blackish, joints 1 and 2 paler, 1 stoutest, subequal to 3; 2 shorter than 1. Pronotum not carinate, hind margin thickened, the short front lobe distinctly defined. Front femora and tibiae stout, slightly curved. Joint 1 of front tarsi much shorter than 2. First genital of male acutely prolonged. Length, 8.5—10 mm.

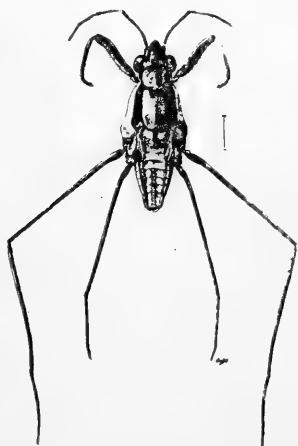


Fig. 195. X 3.
(After Osborn & Drake).

A neotropical species, the only record from our territory being that of Bueno (1911, 245) who states that: "It extends south from Florida throughout South America."

1118 (1294). *LIMNOGONUS HESIONE* (Kirkaldy, 1902a, 137.

Oblong-oval, rather robust. Above black, shining, thickly clothed with a minute appressed pubescence; pronotum, wingless form, with a small median central spot and the edge of hind margin reddish-yellow; in winged form with margins of mesonotum and base of head yellow; antennae and legs in great part dark brown, the bases of front femora paler; prosternum and coxae yellow; under surface with a whitish bloom, the meso- and metasterna blackish; abdomen yellow tinged with dusky. Structural characters as above given. Length, 7—8 mm. (Fig. 195).

Kosciusko Co., Ind., Aug. 27; taken in company with *Gerris marginatus* in a bay of Tippecanoe Lake. Dunedin and R. P. Park, Fla., Nov. 27—April 25; mating on the latter date (H. S. B.). Lake Okeechobee, Fla., April (Davis). Recorded heretofore from Ohio, Michigan, Kansas, Daytona, Fla., and Panama. About Dunedin it is frequent in several lakes, the winged form almost as abundant as the wingless. When disturbed it often leaps a foot or more several times in succession. In Ohio Drake found the apterous form very common in September and October in ponds near Columbus. He states that: "It seems to be distinctly a lacustrine species and found almost entirely in the apterous form. They are very active little creatures and congregate in immense numbers near the shore in sheltered places."

III. METROBATES Uhler, 1871, 108.

Short-bodied, robust, opaque species, the brachypterous form having the head broader across eyes than long, much narrower than mesonotum; eyes very large, coarsely granulated, projecting widely over the sides of pronotum; beak stout, hairy, reaching mesosternum; pronotum wider than long, narrower than head, concave at middle; mesonotum very large, subquadrate, its disk with a wide shallow median impression; abdomen short, declivent, its margins reflexed; front legs short, joint 1 of tarsi only about one-fourth the length of 2; middle and hind legs very long, the middle femora stouter than and about two-thirds the length of hind ones; hind tibiæ and tarsi united only as long as middle tarsi. Macropterous form with hind lobe of pronotum extending back in the form of a broad triangle with sides nearly straight and tip narrowly rounded; elytra longer than abdomen, the nervures prominent and membrane more than twice as long as corium. But one species is known.

1119 (1295). METROBATES HESPERIUS Uhler, 1871, 109.

Brachypterous form velvety black, opaque, densely clothed with a very short velvety pile and, in fresh specimens, with a leaden bloom which forms a wide median and two lateral stripes on mesonotum, covers the greater part of dorsum of abdomen and the whole under surface; base of first antennal, an interocular bilobed spot and a median spot in depression of pronotum, usually dull reddish-yellow; antennæ and legs dark brown, the coxæ yellow beneath. Nymphs with a median stripe along the dorsal groove, two spots each side of mesonotum, the middle of dorsals 3—6 and the greater part of under surface bright yellow. Antennæ almost as long as body, joint 1 gradually thickened from the base,

feebly curved, as long as the others united; 2 and 3 enlarged at tip, 3 shorter, 4 stouter, fusiform, slightly longer than 3. Hind tarsi 1-jointed; front ones with claws placed one-third in front of tip. Length, 3—5 mm.

Kosciusko and Marion counties, Ind., Aug. 12—Sept. 23 (*W. S. B.*). New Lenox, Ill., Aug. 5 (*Gerhard*). Raleigh, N. Car., Sept. 3—Oct. 17 (*Brimley*). In Marion County numerous small colonies were found in little bays of the quiet waters of White River. Ranges from Ontario and New England west to Michigan and Kansas and southwest to South Carolina. Uhler (1884, 271) calls it: "A merry active little insect which moves very rapidly over the water by rowing with its long middle legs and occasionally jumps from the water to grasp mosquitoes, flies and other insects. The eggs are attached during early summer to the projecting twigs, leaves and stems of water plants and by the middle of that season multitudes of the young may be seen in company with the adults on the bayed-out quiet parts of our inland streams." The winged form is apparently very scarce.

IV. RHEUMATOBATES Bergroth, 1892a, 321.

Very small oblong or oblong-oval species having the head quadrate, wider across eyes than long, its blunt tylus projected forward between the bases of antennæ; eyes very large, coarsely granulated; antennæ of males curiously curved and armed with several short acute spines; pronotum much wider than long, its front and hind margins truncate; mesonotum (brachypterous form) subquadrate, three or more times as long as pronotum; elytra rarely present; front legs short, stout, the tibia less than half the length of femur, the basal joint of tarsi very small, the second joint with apical half flattened beneath and claws inserted near the middle; middle legs very long and slender, the tibiæ and usually the femora of male fringed on the inner side with long hairs.

Five species are known, three from our territory. Of the strange antennæ and other secondary sexual characters of the males of our eastern species Bergroth (1908, 379) has written as follows:

"The hind legs of the male are incrassated, curved and deformed in a curious way with singular chitinous processes, making them unique in their monstrosity among all known Heteroptera. The structure of the male antennæ is also very remarkable and unprecedented among other Heteroptera. They much remind one of the male antennæ in the Collemb-

bolan genus *Sminthurides* and it would be interesting to know if they are used in the same manner as in *Sminthurides*, the male of which winds them around the antennæ of the female during copulation. They seem at least admirably adapted to this purpose. Another point of interest is that some of the spines and chitinous processes of the male antennæ and legs seem to be composed of hairs cemented together by some viscous fluid. These insects probably have some glands secreting such a fluid. Under the microscope the last antennal joint shows several sense-organs and at the very tip an excavation bearing a short brush. A brush is also situated at the inner end of the fore tibiæ. The spongy pit at the apical part of the third antennal joint may also be a sense-organ or possibly a suctorial organ. Unfortunately little is known of the biology of these insects. As they thrive only on running water it would be difficult if not impossible to rear and study them in aquaria."

KEY TO EASTERN SPECIES OF RHEUMATOBATES.

- a. Mesosternum wholly yellow; mesonotum distinctly broader than long in both sexes; hind femora of males swollen, strongly curved and fringed within at basal third with a tuft of long hairs.
- b. Median yellow spot on mesonotum large, not or scarcely narrower than that on pronotum; tooth or spine of fourth antennal of male placed in front of middle. 1120. RILEYI.
- bb. Median yellow spot of mesonotum much smaller, distinctly narrower than the one on pronotum, in female sometimes wholly wanting; spine on fourth antennal of male placed behind the middle. 1120a. var. PALOSI.
- aa. Mesosternum yellow with the front margin and two feebly divergent stripes brownish-black; mesonotum scarcely, male, or but slightly, female, broader than long, its median pale spot narrower than that of pronotum; hind femora of male, if swollen and curved, with very short fine hairs along the whole inner margin.
- c. Hind legs in both sexes simple, straight and hairless; middle tibiæ of male fringed with short hooked hairs along the entire inner side. 1121. TENUIPES.
- cc. Hind femora of male swollen and curved as in *rileyi*; middle tibiæ of male fringed with long straight hairs on inner side of basal half, with short straight ones on apical half. 1122. TRULLIGER.

1120 (1297). RHEUMATOBATES RILEYI Bergroth, 1892a, 321.

Oblong, robust, narrowed behind. Above velvety black; a transverse median spot on pronotum, a diamond-shaped median one on mesonotum, a rounded one above the middle coxæ, the front femora and the reflexed connexivum, yellow; antennæ, beak and middle and hind legs fuscous-brown, the bases of first antennals and of the femora yellow; under surface pale yellow, the abdomen often with a dusky tinge. Male with first joint of antennæ gradually thickened from the base, armed beneath at apical third with one or two short spines; second joint very short, armed with a slender spine near base; third strongly curved and with a shallow spinose fossa at apical third; fourth with apical half curved, acute, armed in front of middle with a strong tooth. Middle tibiæ of

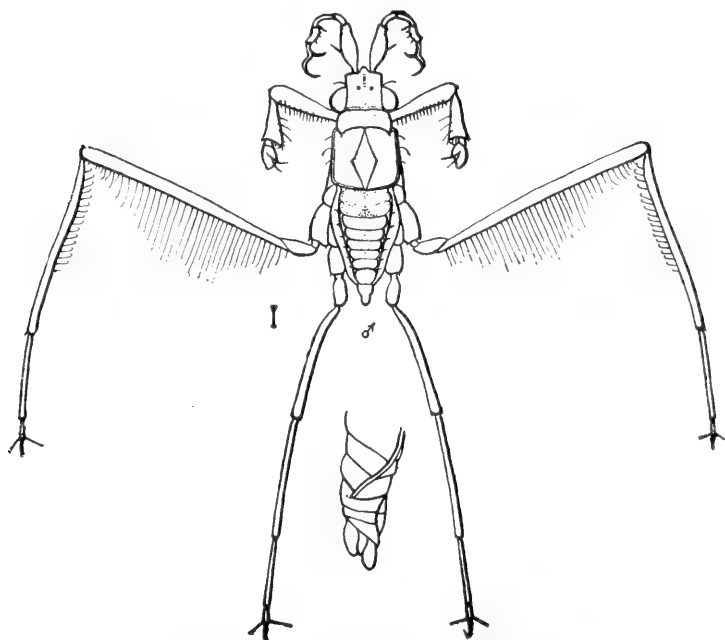


Fig. 196. Male X 11; lower figure, abdomen from side.
(After Heidemann, *Insect Life*).

male fringed with short hooked hairs on inner side of basal half; hind femora of male swollen, strongly curved and fringed within on basal third with a tuft of long hairs, the apex also with two tufts of hairs; hind tibiae narrowed and slightly curved at base, fringed above on inner side with short stiff hairs and with a tuft of long hairs glued together projecting backward from the inner side of basal fourth. Female with antennae and legs unmodified, the former beset with a few long stiff bristles. Length, 2.8—3 mm. (Fig. 196).

Brooklyn, N. Y., and Cranford, N. J., August (*Davis*). Raleigh, N. C., Sept. 13—Oct. 16 (*Brimley*). The known range extends from New York west to Michigan and Minnesota and southwest to North Carolina. Bueno (1905b, 41) states that near Westfield, N. J., *rileyi* "was extraordinarily abundant on the still waters of Echo Lake. On the rivers it hugs the shores and seeks the quiet waters of little coves. Only one winged specimen was found out of hundreds taken." Hussey recorded it as common on woodland pools in Berrien Co., Mich., the specimens "being of the darker variety typical of more northern latitudes." This is true of a male at hand from Rochester,

Minn., in which there is only a trace of the usual yellow spot on mesonotum and the under surface is almost wholly dark.

1120a (—). *RHEUMATOBATES RILEYI* PALOSI var. nov.

Differs from typical *rileyi* in having the body of male more slender, yellow spot of mesonotum only about half the width of that of pronotum; tooth of apical joint of antennæ situated behind instead of in front of the middle of the joint; hind tibiæ straighter, more slender, without a tubercle on apical half and with a fringe of long hairs along the entire inner side. Female with mesonotum wholly black. Length, 2.7—2.9 mm.

Marion Co., Ind., Sept. 16; one pair and several nymphs taken from the edge of a clump of water willows in White River. Palos Park, Ill. (*Gerhard*); two males, one female. Bergroth, in his principal paper on the genus (1908, 381), uses the differential characters as set forth above as some of the principal ones separating *tenuipes* from *rileyi*, but as the former species has the mesosternum striped with black and the hind legs of male simple, straight and hairless, the specimens above described cannot be referred to it.

1121 (1298). *RHEUMATOBATES TENUIPES* Meinert, 1895, 7.

Form and size of *rileyi*. Color much the same, the yellow spot of mesonotum narrower than that of pronotum, sometimes absent; mesosternum with front margin and two longitudinal stripes blackish-brown. Male with first joint of antennæ more swollen, third joint with basal half strongly curved, the spongy spinose fossa covering the under side of apical half and preceded by a slender spine; fourth joint as long as third, curved at base and apex, armed behind the middle with a strong curved tooth. Macropterous form with pronotum prolonged backward covering the mesonotum, its hind portion subtriangular with apex rounded. Mesonotum of female not broader than long. Elytra longer than abdomen, the corium, clavus and membrane distinct. Length, 2.8—3 mm.

Glen Echo, Md. (*Davis*). Raleigh, N. C., Sept. 13—Oct. 20 (*Brimley*). Recorded heretofore only from the District of Columbia. The males are easily distinguished from those of *rileyi* by the unmodified hind femora, the females by the striped mesosternum. The macropterous form is very rare.

1122 (1298½). *RHEUMATOBATES TRULLIGER* Bergroth, 1915a, 63.

Differs from its allies mainly by the characters given in key. Color as in *tenuipes*. Mesonotum in both sexes slightly broader than long. Joint 3 of antennæ of male with spinose fossa occupying the apical third, longer than in *rileyi*, shorter than in *tenuipes*, 4 shorter than 3, its spine on basal half, but nearer to middle than base. Middle femora straight,

with only a few hairs on inner margin near apex. Middle tibiae and hind femora of male as in key. Apical third of hind tibiae with a distinct spine on outer side, the space between the spine and apex beset with a thick tuft of rather long hairs. Length, 2.5—2.7 mm.

Described from Bainbridge, Ga. Not recorded elsewhere.

V. TREPOBATES Uhler, 1894a, 213.

Short, robust species having the head short, declivent in front, the interocular area equal to width of eye; beak short, reaching mesosternum; joint 1 of antennae longest, 2 shortest, 4 slightly longer than 3; pronotum, wingless form, wider than long, concave at middle, its front and hind margins truncate; mesonotum subquadrate, about twice as long as pronotum, its hind margin truncate; metanotum in part visible; abdomen short, conical, the connexiva strongly reflexed; middle and hind legs very long, but shorter than in *Metrobates*, front tarsi 3-jointed, hind ones 1-jointed. Male with genital plate convex, very short; female with apex of last ventral truncate. One species is known.

1123 (1296). TREPOBATES PICTUS (Herrich-Schaeffer), 1848, 111.

Wingless form—Oblong, male; oblong-oval, more robust, female. Color above black and yellow, the markings very variable; head usually with a median black stripe, enclosed on sides and base by a yellow one; disk of pronotum with either three short stripes or two longer wider ones, the middle black; mesonotum largely black, usually with an oval yellow spot each side, sometimes with two yellow stripes, each enclosing a black one; abdomen with dorsals usually in part yellow; connexivals each with a yellow spot; antennae and beak black, the first joint of each yellow at base; femora yellow streaked with black; tibiae and tarsi fuscous-black; under surface a nearly uniform yellowish-white. *Winged form*—

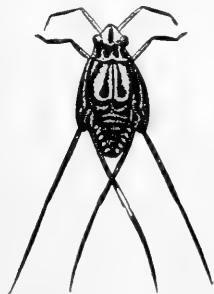


Fig. 197. X 5.
(After Uhler).

Pronotum and elytra dark brown, the former with a small anteapical spot, a stripe each side and the hind margin yellow; inner wings and legs in great part brown. Pronotum prolonged backward, its hind portion broadly triangular with apex narrowly rounded. Elytra surpassing abdomen by one-half the length of membrane. Other structural characters as under generic heading. Length, 3.8—4.5 mm. (Fig. 197).

Marion and Putnam counties, Ind., Sept. 16—28; common in the former on the canal and in the small bays of White River; often in company with *Metrobates hesperius* and *Rhagozelia oriander*. Gualan, Guatemala (Bucno). Plummer's Island, Md.,

June—August (*Barber*). When taken in a water net it is a very active leaper in its efforts to avoid capture, while the other two species run rather slowly about on the bottom of the net. Its known range extends from New England west to Michigan and Illinois and southwest to Florida, Louisiana, Arizona and Central America. The only Florida record to be found is that of Uhler (1884, 270), viz.: "Massachusetts to Florida." Only a few fully winged individuals have been taken in this country, but in the West Indies and Venezuela that form is the prevailing one. Bueno (1908b, 389) has shown that the long-winged individuals of this species and *Rheumatobates rileyi* at times break off their own elytra in order to facilitate mating.

VI. HALOBATES Escholtz, 1822, 106.

Small robust short-bodied species having the head short, slightly wider across eyes than pronotum, its front portion declivent; beak awl-shaped, reaching middle of prosternum; pronotum shorter than head, transverse, its front margin concave; mesonotum more convex and on a higher plane than pronotum; elytra absent; front legs shorter and stouter than the others, their tibiæ slightly shorter than femora, and tarsi nearly as long as tibiæ, the two joints subequal in length; middle and hind legs slender, longer than body, hind femora longer than tibiæ and tarsi united.

The members of this genus live in large colonies on the surface of the warm and quiet parts of the ocean, often several hundred miles from the nearest land. It is, says Uhler (1884, 269):

"In the region of calms near the equator and amidst the great tracts of Sargassum which float there that these creatures are most at home and appear in the greatest numbers. As the patches of this sea-weed are sometimes widely distributed by storms and currents, the insects occasionally occur at long distances from their original home, even as far north as the coast of North Carolina. The strands of floating sea-weed furnish them a nidus for the attachment of their eggs similar to that which their brethren of the fresh water find in their native streams on the mainland."

Two species are known off the coasts of North America, one from our territory.

1124 (1299). HALOBATES MICANS Escholtz, 1822, 107.

Oval, robust. Color a nearly uniform velvety black, densely clothed with a very fine leaden-gray pile; base of head and prosternum some-

times vaguely yellowish; tarsi dark brown. Basal joint of antennæ nearly as long as the others united, 3 shortest, 4 twice the length of 3. Length, 4—4.5 mm.

Ocean Beach, Miami, Fla., Sept. 23 (*Davis*). Recorded also from Lake Worth, Fla. Occurs occasionally along the Atlantic coast as far north as North Carolina.

Family XXXII. VELIIDÆ Amyot & Serville, 1843, 418.

THE SMALLER WATER STRIDERS.

Semi-aquatic Heteroptera of small or medium size, having the body short, oblong or oval; head as wide across eyes as pronotum, declivent in front; beak 4-jointed, reaching behind front coxæ, joint 3 longer than the others united; ocelli absent; eyes small, coarsely granulated; antennæ 4-jointed; pronotum fused with the mesonotum; elytra usually wanting, when present reaching tip of abdomen with connexivum usually rather widely exposed; legs relatively short, the hind femora not or but slightly surpassing abdomen; middle legs, except in *Rhagovelia*, equidistant from front and hind ones; tarsi variable as to genus.

The family is a small one, only about 25 species occurring in North America. Its members have the legs fitted for walking rather than rowing over the water film and, says Bueno (1916a, 53):

"They dwell, as do their larger cousins, the Gerridæ, wherever there is water to bear them on its elastic surface, except that, being far smaller, they do not require such wide reaches for a contented existence. Some may be found in the narrow confines of springs and water holes; others in swift streams where the ripples braid the surface; or again, in salt coast estuaries; and finally certain ones seek the shelter of vegetation growing in slow-moving streams or on the edges of ponds. None, however, are such daring navigators as are the larger Gerridæ, but pass most of their time near the banks, often making short journeys out over the land where they move about with ease."

The principal literature treating of our eastern species is by Uhler, 1884, 1894a; Champion, 1898; Bueno, 1907a, 1916a, 1923, 1924, 1924a; Parshley, 1921a; Drake, 1919b and 1920. Our eastern species are distributed among three genera.

KEY TO EASTERN GENERA OF VELIIDÆ.

a. Front tarsi 2-jointed; fourth antennal (in our species) longest.

I. MICROVELIA, p. 988.

aa. Front tarsi 1- or 3-jointed; first antennal longest.

b. Middle tarsi with third joint split, the cleft with a tuft of feathery hairs (fig. 199, *c*); front tarsi 1-jointed; color black or leaden-gray. II. RHAGOVELIA, p. 995.

bb. Middle tarsi not split and without feathery hairs; front tarsi 3-jointed; color brown or brownish-yellow. III. VELIA, p. 999.

I. MICROVELIA Westwood, 1834, 647.

Very small, oblong, rather robust species having the head convex, usually with a median impressed line, inserted in thorax to eyes, its front portion obtusely conical; eyes prominent, coarsely granulated; winged form with pronotum highest and widest near middle, its front portion with a more or less distinct collar, humeral angles prominent, hind portion prolonged, subdepressed and obtusely triangular; elytra when present, membranous, with few cells, reaching tip of abdomen; connexivum elevated, usually not or but feebly exposed; legs short, rather stout, subequal in length, femora unarmed; front tarsi 2-jointed, middle and hind ones 3-jointed, the basal joint very small, joint 3 longest with tarsal claws inserted before its apex.

Of the members of this genus Bueno has written (1923, 419):

"It contains not only the smallest of the water-striders, but also of all the water-dwellers among our Eastern Hemiptera. It is probably the most abundant as to numbers and species, and the most widely distributed, since it is known from all the continents, nearly all islands and occurs in every zoological region. Be it pond, lake or stream, it is always possible to secure these tiny beings hiding among the grasses or walking about the banks or stalking their game on the green fields of duck-weed floating on some placid pool. As regards wing length the members of this genus are dimorphic, or even polymorphic and the winged and wingless forms are so notably different that they have been frequently taken for distinct species."

Ten species have been recorded from the eastern states, but two of these, described by Uhler⁹⁶ from the West Indies, are of very doubtful occurrence in this country.

⁹⁶The only North American record of his *M. marginata* is that of Uhler (1894a, 219), who states that "it occurs in the United States from Florida to Northern New Jersey." The principal distinctive characters as given by him in his original description (1893, 719) are: "Dull black with pronotum bordered with orange; elytra black, bluntly rounded at tip; abdomen beneath with lateral margin broadly fulvous. Antennæ stout, third and fourth joints longer than the others, the fourth longest; basal joint thicker than the others, pale beneath, much longer than second. Length, 2.2 mm." As far as known it is not represented in any collection in this country and is therefore not included in this work. Of the other, *M. robusta* Uhl. (1894a, 219), the only North American record which can be found is that of Van Duzee (1917, 434) from Florida. Since he cites only the original description, where it is mentioned only from Grenada, it, also, is not further considered.

KEY TO EASTERN SPECIES OF MICROVELIA.

- a. Antennæ equal to or shorter than head and thorax united; abdomen of wingless form without silvery pubescence.
- b. Antennæ shorter than head and thorax united; hind tibiæ curved in male; pronotum, wingless form, with a transverse linear impression before the middle; male elongate, fusiform, female orbicular (fig. 198, *a* and *b*). 1125. BOREALIS.
- bb. Antennæ subequal in length to head and thorax united; hind tibiæ straight in both sexes; pronotum without the linear impression; sexes quite similar in form.
- c. Color sooty black; wingless form with pronotum produced backward to second dorsal and minute white elytral pads present; length, 1.6—2 mm. 1126. ATRATA.
- cc. Color pale to dark brown; wingless form with pronotum not produced backward, reaching at most the base of first dorsal and elytra wholly absent.
- d. Fourth antennal but slightly shorter than width of interocular area, more than twice as long as second; mesonotum visible; length, 1.3—1.6 mm. 1127. HINEL.
- dd. Fourth antennal but little more than half as long as width of interocular area, but little longer than second; mesonotum not visible; length, 1.5—1.8 mm. 1128. AUSTRINA.
- aa. Antennæ longer than head and thorax united; abdomen of wingless form often with silvery pubescence.
- e. Joint 1 of antennæ shorter than 3, 4 subequal to 2 and 3 united; elytra with several white spots; wingless form shining, almost smooth; length, 2.3 mm. 1129. ALBONOTATA.
- ee. Joints 1 and 3 of antennæ subequal in length; wingless forms pubescent, opaque.
- f. Joint 4 of antennæ slightly longer than 2 and 3 united; abdomen and connexivum of wingless form with conspicuous tufts of silvery pubescence; length, 1.7 mm. 1130. BUENOI.
- ff. Joint 4 of antennæ much shorter than 2 and 3 united; length, 2—2.3 mm.
- g. Wingless form with mesonotum concealed by pronotum; dorsum of abdomen with patches of fine bluish-gray pubescence on base and apex; winged form unknown. 1131. FONTINALIS.
- gg. Wingless form with mesonotum visible; dorsum of abdomen, but not the connexivum, with conspicuous patches of silvery-gray pubescence; elytra of winged form brown, unicolorous or nearly so. 1132. AMERICANA.

1125 (1303). MICROVELIA BOREALIS Bueno, 1916a, 59.

Winged form—Elongate, slender, subfusiform, male; broader, suborbicular, female. Head and pronotum dark velvety-brown, the former with a streak of silvery pubescence next the eyes; elytra fuscous, the cells grayish, the apical one with a whitish stripe; base of first antennal, a transverse spot on front margin of pronotum, prosternum, coxæ, basal half of femora and middle of abdomen, dull yellow; remainder of under

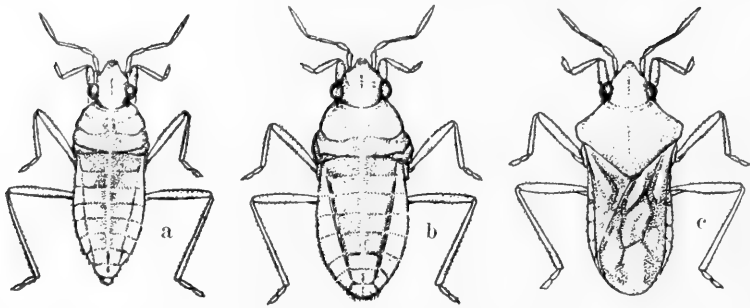


Fig. 198. *Microvelia borealis* Bueno. a, Adult wingless male; b, adult wingless female; c, winged female, X 15. (After Hungerford).

surface fuscous-brown, thickly clothed with very fine silvery-gray pubescence. Joints 1 and 3 of antennæ subequal in length, the former much the stouter, 2 shortest, half the length of 3, 4 fusiform, slightly longer than 3. Pronotum as long as broad, its humeral angles swollen. Male with elytra as wide as abdomen and hind tibiæ distinctly curved. Female with connexivum slightly exposed. *Wingless form*—Darker, the under surface wholly blackish; female with dorsals of abdomen 1—3 black at middle, 4 and 5 wholly black; remainder with a leaden bloom, connexivals each with a small yellow spot; male with these markings vague or absent. Mesonotum in great part visible, its middle one-half as long as pronotum, the latter with transverse impressed line very distinct. Length, 1.6—2 mm. (Fig. 198^{96a}).

Marion and Putnam counties, Ind., Sept. 23—28. In Marion County all stages were taken in numbers from a pond containing much calcareous sediment and many water weeds. *M. americana* was not found in this pond but was abundant in the cold water of spring-fed branches not one hundred yards distant. Clark Junction, Ind., April 4; Chicago, Ill., July 22 (*Gerhard*). White Plains, N. Y., Sept. 29 (*Barber*). Ranges from Maine and Massachusetts west to Illinois and Kansas. Not recorded south of New Jersey. Of its habits Bueno (loc. cit.) says:

"This is perhaps the most abundant of our native *Microvelias*, and may always be found in large colonies on the matted *Lemna* or duckweed on still ponds. It is just as predaceous as its larger congeners and is most frequently found in the wingless form, although the fully winged one is not rare. It begins to breed on emergence from its winter quarters, and lays its eggs on the under side of the duckweed leaves with the head end toward the edge of the leaf, in the usual gelatine. The nymphs emerge in 8 to 13 days, and after *four* molts reach the adult stage in about 16 days minimum or 24 days from the egg to the adult, which would allow for eight generations in a summer. As one female may lay several batches of eggs, her progeny may be found in various instars at the same time. Attention is directed to the unusual number of molts, as the general rule in Heteroptera is five."

^{96a} In the figure the hind tibiæ of male are erroneously shown as straight.

Drake (1920, 207) records it as common throughout Ohio, and Hussey (1922, 35) as numerous in September among bulrushes in Berrien Co., Mich.

1126 (1306¼). *MICROVELIA ATRATA* Bueno, 1916a, 60.

Wingless form—Elongate-oblong, sides subparallel, male; obovate, female; finely pubescent and pilose. Head, pronotum except front margin, and middle of dorsum, dark reddish-brown; base of first antennal, collar of pronotum, connexivum, both above and beneath, coxæ and base of femora, dull yellow; remainder of legs and antennæ fuscous-brown; under surface blackish. Head short, blunt, oval; eyes strongly protruding. Joint 1 of antennæ stoutest, curved, nearly as long as 4; 2—4 gradually increasing in length, the fourth longest, fusiform. Pronotum obtusely triangular, extending back to base of second dorsal, with a white wing-pad protruding from beneath each humeral angle, its disk without impressed line, finely and sparsely punctate. Genital segment visible from above in both sexes. *Winged form*—Velvety-sooty-black with clavus and corium milk-white at base and a white patch in middle cell. Length, wingless form, 1.6—1.8; winged form, 1.7—2 mm.

R. P. Park, Fla., two specimens taken Dec. 16, one April 6; all three by sifting bases of dense clumps of a tall wire-grass growing in pine land one-fourth of a mile from water (*W. S. B.*). Billy's Island, Okefenokee Swamp, Ga., June (*Bueno*). This is the type locality and it has heretofore been recorded only from there.

1127 (—). *MICROVELIA HINEI* Drake, 1920, 207.

Winged form—Elongate-oblong, narrowed behind. Head and pronotum dark brown, the former with a line of whitish bloom along inner margin of each eye, the latter with a yellowish transverse line behind its front margin; elytra pale brown, clavus and corium each with an oblique whitish stripe, corium with an oblique oval spot behind these stripes; membrane with three white spots, the apical one oblong; legs and pronotum dull yellow, tibiæ and tarsi tinged with fuscous; under surface dark brown, thickly clothed with fine bluish-gray pubescence. Antennæ reddish-brown; joint 2 shortest, 1 and 3 subequal, each about two-fifths longer than 2, 4 longest. Head and pronotum rather thickly clothed with very fine whitish hairs, the latter pentagonal and with a fine median carina. *Wingless form*—Elongate-oval, male, slightly broader, female. Ground color as above; abdomen with second, third and fourth dorsals bluish with a narrow median yellow stripe, first and fifth dark brown with a similar stripe, sixth and seventh bluish with an elevated polished brown median line; connexivals each with a large median yellow spot. Pronotum nearly four times as wide as long, with a transverse curved row of punctures near front margin and another row behind middle. Mesonotum visible, more than half as long as pronotum. Metanotal triangles each about one-third as long as width of mesonotum. Side margins of connexivum straight, male, evenly curved, female. Nymphs broadly oval. Length, 1.3—1.6 mm.

Dunedin and R. P. Park, Fla., Nov. 18—April 23 (*U. S. B.*). Found in numbers around Dunedin in small pools and ditches and among the water-weeds along the margins of ponds and lakes; one was also sifted from grass-roots some distance from water. At the Park a half dozen were taken from decaying weeds and other debris in a slough of the everglades. These are the first records for the State. Ann Arbor, Mich., July 30—Aug. 5 (*Hussey*). Described from Ohio. The known range extends from New England west to Michigan and southwest to Florida and Mississippi. The white markings of the elytra of the macropterous form are very similar to those of *albonotata* Champ.

1128 (—). *MICROVELIA AUSTRINA* Bueno, 1924, 191.

Wingless form—Elongate-oblong, sides parallel or nearly so. Color a nearly uniform dark brown, clothed with very fine appressed grayish hairs; front margin of pronotum reddish-brown; antennæ fuscous-brown, the second joint sometimes paler; legs brownish-yellow, tinged with fuscous, the front femora wholly yellow; abdomen without spots of silvery pubescence. Head strongly convex, its median impressed line distinct. Antennæ relatively stout, joints 2 and 3 subequal in length, 1 slightly shortest, 3 most slender, 4 fusiform, slightly longer than 3, but little more than half as long as width of interocular area. Pronotum subquadrate, about one-third wider than long, front margin truncate, hind one very slightly rounded; disk with reddish front margin smooth, remainder distinctly punctate and with an entire median carina. Mesonotum concealed; metanotal triangles very small. Hind tibiæ straight in both sexes. Abdomen with sides subparallel, the connexiva wide, subvertical, male; distinctly narrowed behind with connexiva strongly reflexed against the dorsum, female; last three dorsals with a fine median impressed line. Length, 1.5—1.8 mm.

Raleigh, N. Car., April 30—May 22 (*Brimley*). Bueno's types were from Raleigh and it is not known elsewhere. The small size, parallel body, uniform brown color, short subequal joints of antennæ and strongly reflexed connexiva of female, readily distinguish this from all our other species. The *M. parallela* Blatch. (1925, 48) is a synonym.

1129 (1304). *MICROVELIA ALBONOTATA* Champion, 1898, 129.

Winged form—Elongate, slender, sides subparallel. Head and pronotum dark brown, the former with two short, vague reddish-brown stripes, also a line of white bloom along inner margin of each eye; a transverse spot on front margin of pronotum, and its side margins beneath, beak, connexivum, coxæ, femora in great part, and genital plate, dull yellow; elytra brown, clavus and corium each with an oblique white stripe, the latter also with a large oval white spot; membrane with three

similar spots; tibiae and tarsi pale brown; under surface dark brown, clothed with very fine bluish-gray pubescence. Head without a median impressed line. Antennae long and very slender, joint 1 three-fifths longer than 2, 3 twice as long as 2, 4 as in key, nearly twice as long as width of vertex. Pronotum slightly wider at middle than long, its hind margin with apex narrowly rounded. *Wingless form*—Elongate, subfusiform, male; stouter, oblong and subparallel, female. Brownish-yellow, first two dorsals blackish-brown, next three greenish-yellow; under surface greenish-yellow, the sides of ventrals pale. Male with hind femora and tibiae armed beneath with a row of short spines. Female with connexiva more strongly subvertically elevated than male. Length, 2.2—2.5 mm.

Mobile, Ala., Sept. 8 (*Gerhard*). Plummer's Island, Md., Aug. 15 (*Barber*). White Plains and Valhalla, N. Y., September—October (*Bueno*). Described from Guatemala. Definitely recorded in this country from Massachusetts, New York, New Jersey, Illinois, Maryland and Georgia. Bueno (1923, 421) says of this species: "It is the largest of our eastern forms except *americana*, from which its slim body, long thin antennae and white spangled hemelytra at once distinguish it."

1130 (—). *MICROVELIA BUENOI* Drake, 1920a, 20.

Winged form—Elongate, subfusiform. Head, pronotum and under surface dark velvety brown; base of antennae, a transverse line on front margin of pronotum, coxae and femora in great part, yellow; elytra brown, the membranous cells whitish; antennae, tibiae and tarsi paler brown; head with silvery-gray hairs next the eyes and under surface clothed with fine grayish hairs. Antennae as in key. Pronotum slightly wider across middle than long, humeral angles rounded, nodulose. Elytra covering the abdomen. Female a little larger and more robust than male. *Wingless form*—Blackish-brown; abdomen with a spot of silvery hairs on each side of the first two and last two dorsals, and on each connexival. Pronotum at middle about three times as long as mesonotum. Length, 1.7—2 mm.

Clark Junction, Lake Co., Ind., July 4; Chicago, Ill., April—May (*Gerhard*). Described from near Cranberry Lake, N. Y. Recorded also from Massachusetts, Michigan and Minnesota. "The species dwells in small secluded coves very near the shore, usually under the shelter of overhanging vegetation or among aquatic plants. A few were taken on moist ground quite near the water's edge." (*Drake*).

1131 (1306½). *MICROVELIA FONTINALIS* Bueno, 1916a, 58.

Wingless form—Oblong-oval or subfusiform, rather robust. Above dark reddish-brown thickly clothed with fine appressed yellowish hairs; head with a median blackish line; front margin of pronotum, middle of first and second dorsals and a large spot above and below on each con-

nexival, usually brownish-yellow; sides of second and third dorsals and the whole of sixth and seventh ones usually bluish-gray; beak, prosternum, basal half of first antennal and legs except knees and tarsi, dull yellow; under surface blackish, thickly clothed with rather long grayish hairs. Head obtusely triangular, convex, slightly longer than width of vertex; eyes small, rounded, not prominent. Antennæ relatively stout, pilose, joint 2 shortest, 1 and 3 subequal, 4 longest, 3 most slender. Pronotum with two transverse rows of rather coarse punctures. Abdomen with seven dorsal segments and genital visible; connexivum strongly reflexed, more so in female. Length, 2—2.3 mm.

Putnam Co., Ind., Sept. 28; three adults and nymph taken from the pools below a hillside spring (*W. S. B.*). White Plains, N. Y., April—August (*Bueno*). Recorded heretofore only from New York, New Jersey, Ohio and Michigan. Bueno (*loc. cit.*) says: "It was taken in numbers at White Plains in a spring in a marshy woodland, where it clings to the long mosses growing into the water or walks about leisurely a short distance from the rocky sides of the basin." Resembles *americana* but less tapering behind, pronotum distinctly punctate, mesonotum not visible and pale dorsal patches of abdomen usually better defined and bluish instead of silvery-gray as there.

1132 (1307). MICROVELIA AMERICANA (Uhler), 1884, 274.

Elongate-oval, robust for the genus. Winged form with head, pronotum, and under surface in great part black, thickly clothed with minute appressed yellow or grayish hairs; narrow edges of pronotum and a transverse line on its front margin, basal joint of antennæ, a large spot on each connexival, legs except knees and tarsi, and last ventral in great part, yellow; antennæ, except base and knees and tarsi, fuscous-brown; elytra fuscous-brown, the cells in fresh specimens vaguely paler. Antennæ as in key, joint 2 shortest, 4 slightly longer than 3. Pronotum as wide at middle as long, its humeral angles less prominent than in the smaller species, apex of hind margin obtusely angled. Elytra narrower than abdomen, the connexivum subvertical, widely exposed. *Wingless form*—Darker, the legs in great part dark brown; connexivals each with a large median oval yellow spot; under surface thickly clothed with silvery-gray hairs. Pronotum with a transverse linear impression in front of middle. Length, 2.1—2.4 mm.

Marion, Putnam and Lawrence counties, Ind., July 16—Sept. 23 (*W. S. B.*). Palos Park, Ill., and Golden, Colo., July—September (*Gerhard*). This is our largest and most widely distributed species, ranging from Ontario and New England westward over almost the entire United States. No definite Florida station is recorded, but both Van Duzee and Bueno include that State in their distributional notes. Of its habits Uhler (1884, 275) says:

"It is a very attractive object when seen upon the surface of a quiet brook, where it runs over the water film with astonishing rapidity, not with the rowing impulses of a *Gerris*, but standing well up and moving all the legs in steady succession. In the Middle States they hibernate in colonies beneath the overhanging banks of the smaller streams. Only in warm sheltered situations do they pass to the full completion of the winged adult stage, and in the colder parts of the country, as in Maine and lower Canada, they seem to be always unwinged."

Bueno (1923, 420) states that: "The young, after five molts, reach the adult stage in some six weeks. As breeding begins about April, there may be as many as four or five broods before the end of October. It seems to prefer the sloping banks of sluggish streams or ponds, or to perch on partly submerged sticks, or on the sides of springs or water holes in the outgrowing mosses. It is pre-eminently predaceous and will attack in force any insects struggling in the water."

II. RHAGOVELIA Mayr., 1865, 445.

Robust species of medium size for the family, readily distinguished by the 1-jointed front tarsi and the long, deeply cleft terminal joint of the second pair. In this cleft there is a row of long ciliated hairs arising from a common base. When the insect moves on the surface of the water these are extended fan-like, but in repose are folded back within the fissure. They have the head short, blunt, wider across eyes than front margin of pronotum; antennæ rather stout, the basal joints with erect bristly hairs, joint 1 longest, slightly curved, about two-thirds longer than 2; 2 and 3 subequal, 4 usually slightly shorter than 3. Pronotum variable as to species; elytra usually wanting; basal joint of middle tarsi very short or wanting. Male of wingless form with hind margin of pronotum broadly rounded or subangulate; abdomen apically much narrowed, the connexivum strongly subvertically reflexed. Female of wingless form with hind margin of pronotum either subtruncate or prolonged as a blunt spine; connexiva usually reflexed against part of the dorsal surface of abdomen.

Of the function of the tuft of hairs in the slit of middle tarsus Bueno (1907a, 63) states: "The middle tarsus is in contact with the water along its entire length, with the slit vertical to the surface. When in this position the spread tuft of hairs projects beneath into the water and is a powerful auxiliary in swimming." Five species are known from the

eastern states.⁹⁷ On account of the rarity of macropterous individuals the following key is based on the brachypterous ones alone.

KEY TO EASTERN SPECIES OF RHAGOVELIA.

- a. Last joint of middle tarsi subequal in length to or longer than the one preceding; hind femora of male distinctly swollen, spinose beneath; reflexed connexiva of female almost meeting along part of the dorsal surface of abdomen; color blackish, sometimes with a faint bronze lustre. Fresh water species.
- b. Pronotum of female subtruncate behind; hind femora of male not more swollen than in female, armed beneath on apical half only.
- c. Connexivum narrowly or not at all yellow; joint 1 of antennæ distinctly more than one and one-half times as long as 4.
- d. Meso- and metanota broadly exposed behind the pronotum; first segment of connexivum of female with a tuft of long matted hairs arising from its hind angle; front trochanters of males with a stout black spine on outer face. 1133. OBESA.
- dd. Mesonotum wholly and metanotum in great part, concealed beneath pronotum; first segment of female connexivum without tuft of hairs; front trochanters of males unarmed. 1134. CHOREUTES.
- cc. Connexivum with margins broadly yellow; joint 1 of antennæ not more than one and one-half times as long as 4; front trochanters of male armed and first connexival of female with tuft of hairs as in *obesa*. 1135. FLAVICINCTA.
- bb. Pronotum of female prolonged backward in a slightly elevated knobbed process; hind femora of male strongly swollen, armed beneath throughout their length. 1136. ORIANDER.
- aa. Last joint of middle tarsi distinctly shorter than the one preceding; hind femora not swollen, in males minutely setose beneath; reflexed connexiva of female widely separated throughout their length; color leaden gray. Salt-water species. 1137. PLUMBEA.

1133 (1309). RHAGOVELIA OBESA Uhler, 1871, 107.

Oblong-ovate, strongly narrowed behind. Above black, with a brownish or bronzed tinge; pronotum with a small orange-red spot each side of median line and narrow side margins of both it and connexivum orange-red; antennæ, tibiæ and tarsi dark brown; coxæ, trochanters and usually the base of front femora yellow; under surface clothed with a short bluish-sericeous pile, this extending over front margin of pronotum. Head with interocular area scarcely wider than eye, and with a fine elevated longitudinal line. Antennæ with a few short erect hairs. Pronotum minutely very sparsely punctate and with a fine median carina, its hind margin broadly rounded, male, subtruncate, female; in winged females with apex prolonged, curved upward, its tip slightly widened, feebly forked. Meso- and metanota both fully exposed as concentric rings be-

⁹⁷The "Indiana" records of Walker (1873, 161) and Champion (1898, 136) for *R. distincta* Champ. were probably based on a mislabelled specimen as *distincta* is a Mexican species known in this country only from Arizona.

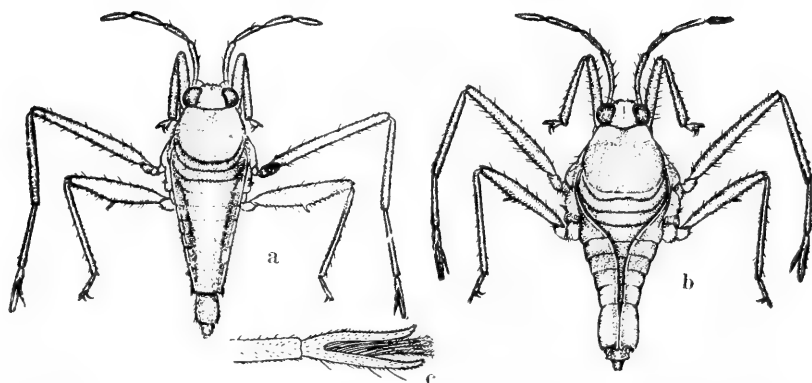


Fig. 199. *Rhagovelia obesa* Uhl. a, Male; b, female X 10; c, cleft terminal joint of middle tarsus with enclosed tuft of fringed hairs. (After Hungerford).

hind the pronotum (fig. 199, b). Middle femora in both sexes distinctly longer than hind ones, the latter armed beneath at apical third with a rather stout curved spine, this followed toward apex by several minute teeth. Female with appressed connexiva contiguous above fourth dorsal, then divergent and again contiguous over the last one or two dorsals (this character not well shown in the figure); first dorsal genital segment less than twice as wide as second. Length, 3.5—4 mm. (Fig. 199).

Staten Island, N. Y.; Cranford and Lakehurst, N. Jer., July—August (Davis). Cornwall, Conn., July 7 (Frost). Its recorded range extends from Ontario and New England west to Michigan and southwest in the coastwise states to Florida; also Utah and California. Not definitely known from Indiana but perhaps occurs in the northern counties. The only Florida record is that of Uhler (1876, 334) under the name of *R. collaris* Burm. and probably should be referred to *choreutes*. It is probable that many of the inland and western records should be referred to *oriander*. Of the habits of *R. obesa* Bueno states: "This species is found in the rapid parts of streams throughout the Atlantic States. In such places they congregate in schools, swimming powerfully in zigzags against the current, or at times sheltered behind some outjutting rock, placidly paddling in the eddies that swirl about it. It is sometimes found winged about New York, but so rarely that my 15 years collecting have yielded only seven."

1134 (—). *RHAGOVELIA CHOREUTES* Hussey, 1925, 67.

Form and size of *obesa*. Dull black; hind portion of pronotum, metanotum and basal dorsals of abdomen thickly clothed with very short yellowish hairs; two spots near front margin of pronotum, basal third of

first joint of antennæ, coxæ, trochanters, basal halves of front femora and margin of basal third or more of connexivum, orange-yellow; under surface of body and apical fifth of pronotum densely clothed with bluish-gray pile. Head across eyes more than twice as broad as long; vertex convex, its base about one-third wider than diameter of an eye. Joint 1 of antennæ nearly twice as long as 4, 2 slightly longer than 3. Pronotum extending much farther back than in *obesa*, covering the mesonotum and part of metanotum, its hind margin broadly rounded, male, subtruncate, female; disk coarsely, rather sparsely irregularly punctate. Connexiva of female meeting above the last dorsal, sometimes above the last three, their basal halves widely separated. Legs distinctly shorter and stouter than in *obesa*, the hind femora armed beneath much as there. Length, 3.6—3.8 mm.

Gainesville, Fla., Oct. 13 (*Hussey*); this, the type and only recorded locality, several hundred specimens having been there collected.

1135 (—). RHAGOVELIA FLAVICINCTA Bueno, 1924a, 249.

Form of the two preceding species but less robust than either. Dull black; vertex and basal two-thirds of pronotum more shining; basal third or more of first antennal, a large transverse spot on apical third of pronotum, entire margin of connexivum, prosternum, coxæ, trochanters and basal third of front femora, a rather bright yellow; under surface densely clothed with a fine bluish pile; last ventral and genital fuscous and with scattered yellow hairs. Antennæ fuscous-brown, joint 1 distinctly curved, 2 and 3 subequal, 4 slightly shorter than either. Pronotum covering in great part the mesonotum, its hind margin broadly rounded, male, subtruncate, and impressed at middle, female; metanotum exposed as in *obesa*. Connexiva of female almost meeting above fourth dorsal, then slightly divergent and again subcontiguous above the last one, the first segment with a tuft of matted hairs. Male with a stout black spine on front trochanters, and basal spines of hind femora stouter than in *obesa*, the shorter ones following of nearly equal length. Female with trochanters unarmed, basal spine of hind femora longer and more slender than in male, the others minute. Length, 3.2—3.8 mm.

Raleigh and Swannanoa, N. C., July 17—Oct. 20 (*Brimley*). Known only from that State.

1136 (—). RHAGOVELIA ORIANDER Parshley, 1922, 19.

Form and size of *R. obesa*. General color darker, without the faint bronzed tinge of *obesa*; yellow markings the same, the spots on front margin of pronotum obscured by a bluish bloom. In addition to the structural differences given in key, the male has the hind margin of pronotum obtusely angulate; abdomen wider, less narrowed apically; hind femora much more swollen, armed above on inner side near middle with an acute spine, this preceded on basal half with a row of fine, equal, closely-set teeth, and followed on apical half by two rows of fine teeth, those of the upper row the larger. The female, in addition to the knobbed process,

which is not forked at tip as in the winged form of *obesa*, differs in having the reflexed connexiva approximate, but not contiguous on apical fourth of abdomen; basal half of middle femora compressed, and first dorsal genital more than twice as wide as second. Length, 3.6—3.8 mm.

Marion and Putnam counties, Ind., Sept. 16—28; taken in the former by scores from the base of clumps of water willow, *Dianthera americana* L., growing in stagnant pools along the margins of White River, five miles north of Indianapolis. Nymphs were present in numbers and some of the adults mating. At hand also from New Lenox, Ill., Aug. 8 (*Gerhard*). Described from Brookings, S. Dak., and not recorded elsewhere.

1137 (1312). RHAGOVELIA PLUMBEA Uhler, 1894a, 217.

Short, robust, subconical behind. Leaden gray or black with a bluish tinge; a transverse median spot on pronotum, narrow edge of connexivum, base of first antennal, trochanters, coxæ in part, and base of front femora, yellow. Vertex much wider than in *obesa*, nearly twice the width of eye. Antennæ more slender, joints 2 and 3 united longer than 1, 3 slightly longer than 2, 4 one-half the length of 3. Beak reaching middle of mesosternum. Pro- and mesonotum of wingless form as in *obesa*. Abdomen wider, less compressed, its margins less elevated, the more reflexed ones of female widely separated. Middle femora distinctly longer than hind ones, the latter but feebly swollen, those of males armed beneath at apical third with a pair of slender divergent curved setæ-like spines. Length, 2.5—3.2 mm.

Chokoloskee, Fla., March 13. A colony of several hundred was milling, mating and gyrating about among the row-boats at the docks close by the village store. Recorded by Barber from Indian River, Marco and Ten Thousand Islands, Fla. Described from Grenada. Uhler (loc. cit.) says: "This is a common species on the surface of salt water around the inlets of the Florida Keys." Although he describes the hind femora as unarmed, those of the males at hand are feebly spinose as described above. The wingless form only is known. Champion (1898, 140) says: "Wings would be of very little use to these insects, the water upon which they live never drying up; whereas in the fresh-water forms, which have occasionally to migrate in times of drouth, wings are a necessity, at least in a certain number of individuals."

III. VELIA Latreille, 1804, 163.

Oblong, rather robust, pubescent species having the front of head subconical; antennæ longer and more slender than in the other two genera; eyes coarsely granulated; beak reaching

middle of mesosternum; pro- and mesonota in one piece, in winged form with front portion declivent, hind one broadly triangular with apex rounded; elytra, when present, reaching tip of abdomen; connexivum reflexed, rather widely exposed; legs rather stout, subequal in length; front tarsi with joints 1 and 2 very short; middle and hind ones with joints longer, cylindrical.

Three species are known from the eastern states. They live amongst the roots of grasses, in bunches of decaying weeds and beneath other cover, more often on the ground near stagnant water than on its surface. The eggs are deposited on floating aquatic plants, floating sticks or other debris just beneath the surface of the water. In one species (*V. watsoni*), kept in captivity by Hoffman, they hatched in 12 days. The average span of nymphal life was 27 days, and adults remained alive for nearly two years. They were found to be both predaceous and cannibalistic, feeding not only on one another but upon various forms of living, crippled or dead insects placed upon the surface of the water, as well as on small animals swimming beneath the surface film. Many nymphs were reared to maturity on a straight diet of cockroaches. The specific names of two English species are *currens* and *riculosum*, denoting that they there live in running streams rather than ponds and lakes.

KEY TO EASTERN SPECIES OF VELIA.

- a. Middle and hind tarsi subequal in length, the former with joints 2 and 3 subequal; head not immersed in thorax to eyes; form slender.
- b. Antennæ with joint 2 one-fourth shorter than 3; hind margin of pronotum (brachypterous form) without a fringe of long hairs; tubercles on sides of pronotum scarcely evident.
 - 1138. STAGNALIS.
- bb. Antennæ with joints 2, 3 and 4 subequal in length; hind margin of pronotum with a fringe of long hairs; tubercles on sides of pronotum very distinct.
 - 1139. WATSONI.
- aa. Middle tarsi distinctly longer than hind ones, the former with joint 2 much longer than 3; head immersed in thorax to eyes; form robust.
 - 1140. BRACHIALIS.

1138 (1313). *VELIA STAGNALIS* Burmeister, 1835, 212.

Elongate, slender, sides subparallel. Brownish-yellow or tan-brown; legs paler brown mottled with dull yellow; under surface with a broad blackish stripe extending from prosternum to sixth ventral. Basal joint of antennæ feebly curved, stouter and one-third longer than any of the others, 2 shortest, 3 and 4 subequal, very slender. Eyes smaller than in *brachialis*. Pronotum finely, densely pilose, posterior portion coarsely punctate, its hind margin narrowly rounded. Length, 4—4.2 mm.

Dunedin, Fla., April 17; one specimen from a bunch of weed roots on the margin of Jerry Lake, the first record for the State (*U. S. B.*). District of Columbia, Oct. 26—Feb. 25; sifted from old leaves (*Davis*). Described from Pennsylvania. Known also from Ohio, North Carolina and the West Indies.

1139 (—). *VELIA WATSONI* Drake, 1919b, 1.

Form and size of *stagnalis*. General color dark brown; legs yellow, the femora and tibiae each with the knees and a ring at middle, brown; tarsi and apical third of tibiae also in great part brown. Female with posterior half of pronotum and connexivum in part dull yellow. Male with a yellow spot on the front half of each of the last three connexivals. Head as in *stagnalis*, the impressed median line very evident; antennae as in key, the basal joint longer and much stouter than the others, distinctly curved. Disk of pronotum with a median lengthwise carina, coarsely punctate, a distinct tubercle each side above the middle. Sides of abdomen parallel; connexiva strongly reflexed; first and second dorsals each with two carinae. Length, 4—5 mm.

Gainesville, Fla., July 28 (*Barber*). Taken in numbers by Drake from stagnant water in an old swamp near Gainesville. Recorded also from New Jersey and Kansas.

1140 (1314). *VELIA BRACHIALIS* Stal, 1860, 82.

Oblong, much stouter than our other species. Color of winged form a nearly uniform brown or brownish-yellow, densely clothed with a fine

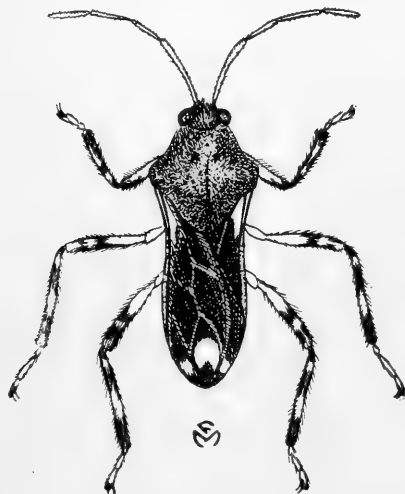


Fig. 200, X 8. (Original).

velvety pile; posterior portion of pronotum and sides of pleura and ventrals, darker; a triangular spot behind each apical angle of pronotum, and a small one on each incisure of connexivum, silvery white; coxae, trochanters, tarsi, lower surface and base of femora, and rings on apical half of femora and near middle of tibiae, yellow; corium with a narrow submarginal white line on basal third; membrane dark brown with three white subapical spots, the front or median one cordate, the others smaller and rounded. Head with a fine median impressed line. Joint 1 of antennae stout, curved, nearly twice as long as 2; 2 and 4 subequal, 3 slightly longer than either. Prono-

tum with a preapical transverse row of fine punctures in front of a smooth area, behind this the greater portion of disk coarsely punctate and with a fine median longitudinal carina; humeral angles rounded,

prominent, hind margin obtusely rounded. Elytra conjointly narrower and very slightly shorter than abdomen, the membrane differing from corium only in the absence of pile. Legs relatively stout, middle femora longest, front ones shortest, hind ones armed beneath with a row of very fine teeth. Middle of metapleura with a small opening protected by one to three acute erect spines. Brachypterous form with elytra represented by a pair of very short narrowly triangular white pads projecting behind the pronotum; last three dorsals with a curved line of white pubescence. Pronotum narrower and shorter, the humeral angles scarcely evident. Length, 5—5.3 mm. (Fig. 200).

Dunedin, Sarasota, Fort Myers, Bassenger and R. P. Park, Fla., Dec. 1—March 28. Taken in small numbers at all stations beneath cover in mucky places near ponds and ditches; at Sarasota in a tidewater bay-head. Usually two to four are found together. Only one was taken from the water, this being dragged out with a mass of *Chara* from a limestone ditch at R. P. Park. Seven of the 24 specimens at hand are macroppterous. A tropical species described from Brazil and recorded from Mexico, Central America, Panama and the West Indies. Known in this country only from Georgia, Florida and Texas.

Examples of Florida specimens were determined by both Bueno and Van Duzee as *I. australis* Bueno (1916a, 54). They were later compared with Panama specimens of *I. brachialis*, received from W. E. China and determined by Champion, and were found to be identical, not only in relative length of tarsi and tarsal joints, but in every other respect. Bueno's name, therefore, falls as a synonym.

Family XXXIII. SALDIDÆ Amyot & Serville, 1843, xlix
(*Acanthiidae*).

THE SHORE BUGS.

Small oval or elongate-oval littoral Heteroptera of dull color having the front of head almost vertical; ocelli present, in our species approximate or subcontiguous; eyes large, coarsely granulated, projected outward and backward; tylus prominent, cylindrical, obtuse, shorter than cheeks; beak 3-jointed, in repose not appressed to under surface of head or prosternum, the first joint very short, the second very long; bucculæ short, broad, rounded; antennæ 4-jointed, inserted low down on the sides of cheeks, the basal joint shorter than head, rather stout, somewhat curved, second much longer; pronotum subtrapezoidal, the apex or front side much the shortest, the lateral margins oblique, the hind one broadly concave; scutellum large,

triangular, almost equilateral; elytra usually present, without cuneus, conjointly subrectiform, the costal margin broadly curved, its basal third usually flattened and reflexed; membrane relatively small, its longitudinal nerves straight, joining a curved terminal one, thus forming several long cells; legs slender, the hind ones longest with coxæ broad, fitted for leaping; tarsi 3-jointed, the first joint very short, second equal to or longer than third; claws long, slender, curved.

More than 100 species of this family, often known as Acanthiidae, have been described, mostly from the Old World. They are predaceous, frequent damp or marshy soils and, says Uhler (1884, 265): "Are often found in countless numbers upon the salt and brackish marshes of our sea coasts. Their movements strongly recall those of the tiger-beetles, which inhabit the same places. When approached or disturbed they leap from the ground, arise a few feet into the air by means of their wings, and alight a short distance away, taking care to slip quickly into the shade of some projecting tufts of grass or clod, where the hues of the soil harmonize with the color of their bodies."

The family Saldidae is the final one of the suborder Gymnocerata and serves as the connecting link between the terrestrial or semiaquatic forms previously treated, and the more truly aquatic ones of the suborder Cryptocerata which are to follow. About 35 species are known from North America, 22 of which occur in the eastern states. These represent two subfamilies and are distributed among seven genera. The principal literature treating of them is by Say, 1832; Stål, 1873; Uhler, 1877, 1884; Champion, 1900; Reuter, 1912; Bueno, 1923, 1923a.

KEY TO EASTERN GENERA OF SALDIDÆ.

- a. Third and fourth joints of antennæ not or very rarely strongly swollen; pronotum without conical tubercles on front lobe (Subfamily Saldinæ).
 - b. Membrane with five complete elongate cells of nearly equal size; last ventral of female truncate. I. PENTACORA, p. 1004.
 - bb. Membrane with only four entire longitudinal cells.
 - c. Sides of pronotum more or less flattened; front callus of pronotum never reaching the side margins; apex of pronotum subequal in width to that of head across eyes.
 - d. First or inner cell of membrane produced two-fifths or one-half its own length beyond the base of the second; elytra often punctate, always without sericeous spots; embolium wholly black. II. SALDA, p. 1007.

- dd.* First or inner cell of membrane produced but slightly or not more than one-third its own length beyond the base of second.
- e.* Corium with two distinct veins, the inner one forked toward apex, its branches reaching the membranal suture; apex of first or inner cell reaching or nearly reaching apex of second.
- III. SALDULA, p. 1008.
- ee.* Corium without distinct veins; elytra opaque; embolium a dirty white.
- IV. MICRACANTHIA, p. 1013.
- cc.* Sides of pronotum scarcely or not at all flattened; front callus of pronotum reaching to or nearly to the side margins; apex of pronotum narrower than head across eyes.
- d.* Elytra glabrous, very shining, in brachypterous form convex and entirely coriaceous, the membrane scarcely differentiated; joints 3 and 4 of antennæ distinctly thicker than 2; ocelli slightly separated.
- V. LAMPACANTHIA, p. 1014.
- dd.* Elytra sericeous, opaque, flat, piceous marked with white, the membrane distinct; joints 3 and 4 of antennæ not thickened; ocelli contiguous, set on a distinct elevation.
- VI. CHARTOSCIRTA, p. 1016.
- aa.* Third and fourth joints of antennæ strongly swollen; pronotum with two prominent erect tubercles on front lobe; head narrower with eyes nearer together than in preceding genera (Subfamily Saldoidinæ).
- VII. SALDOIDA, p. 1017.

I. PENTACORA Reuter, 1912, 7.

This genus comprises four species above the average in size for the family and usually found along sea beaches. The presence of five elongate equal cells in the wing membrane is the one important character separating the group from the other genera of the subfamily. In some of the cells there is often an oblique vein running diagonally from one main nervure to another, but this is not taken into account in fixing the number of cells.

KEY TO EASTERN SPECIES OF PENTACORA.

- a.* Upper surface dull, with appressed pubescence; elytra often with short erect or inclined dark hairs.
- b.* Narrow side margins of pronotum and elytra with a row of very short erect setæ; joint 2 of antennæ much longer than 3 and 4 united; length, 6.5—8 mm. 1141. SIGNORETI.
- bb.* Margins of pronotum and elytra without setæ; joint 2 of antennæ equal to or shorter than 3 and 4 united; length, 5—6 mm.
- c.* Pronotum four times as wide as long at middle; elytra with numerous short suberect hairs; color above mostly black; costal area narrowly yellow with edge black. 1142. LIGATA.
- cc.* Pronotum three times as wide as long at middle; elytra beset with very short inclined bristle-like hairs; color above mostly dull yellow; costal area concolorous. 1143. SPHACELATA.

aa. Upper surface shining, without appressed pubescence, but with numerous long erect dark hairs. 1144. HIRTA.

1141 (1316). *PENTACORA SIGNORETI* (Guerin), 1857, 401.

Elongate-oval. Color above dull yellow and black, the black markings as follows: head between the eyes, middle of front lobe of pronotum, a small quadrate spot at middle and a rounded one on each humeral angle of hind lobe, scutellum except two spots near apex, clavus, except a spot behind middle, inner portion of corium and three spots on embolium; under surface in great part, black, the prosternum, hind margins of meso- and metasterna and sides of abdomen dull yellow; antennæ and legs brownish-yellow, the basal joint of former and apical half of femora in part blackish; tibiæ with black setæ. Beak dark brown, reaching hind coxæ. Joints 1 and 4 of antennæ shortest, subequal, 3 one-half longer than either. Pronotum with hind margin deeply concave, the humeral angles wide, prolonged, subdepressed and with a small rounded black callus; front lobe with black median callus prominent. Scutellum with basal half convex, separated from apical one by a curved transverse impression. Elytra surpassing abdomen by three-fourths the length of membrane. Length, 6.5—8 mm. (Fig. 201).

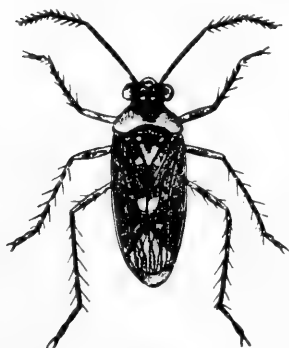


Fig. 201. X 4. (After Uhler).

longer than either. Pronotum with hind margin deeply concave, the humeral angles wide, prolonged, subdepressed and with a small rounded black callus; front lobe with black median callus prominent. Scutellum with basal half convex, separated from apical one by a curved transverse impression. Elytra surpassing abdomen by three-fourths the length of membrane. Length, 6.5—8 mm. (Fig. 201).

Punta Gorda, Fla., Nov. 15; taken on a mud flat (*Davis*). St. Augustine, Fla., January; Corpus Christi, Tex., July 20 (*Gerhard*). Recorded by Barber from numerous stations along both the east and west coasts of Florida. A species of the sea beaches, described from Cuba and ranging from Massachusetts southwestward to Florida, Texas, California and Mexico. Uhler (1877, 432) says: "It lives on the pale sands not remote from the beach, and the darker varieties may be met with running briskly over the gray or blackish sandy mud, neglecting the dry spots, but often swarming on the moist places."

1142 (1318). *PENTACORA LIGATA* (Say), 1832, 34; I, 359.

Elongate-oval. General color above black, thickly clothed with fine grayish pubescence; narrow reflexed margins of pronotum and elytra, two small spots on hind margin of pronotum, four on margins of scutellum, one on apical third of clavus and six or eight on corium and embolium, dull yellow; membrane fuscous-brown, with three or four vague median yellow marks; under surface black, the hind margins of all the segments more or less pale yellow; antennæ and beak brown; legs dull yellow with black stripes. Beak reaching between middle coxæ. Joint 4 of antennæ

shorter than 3, much longer than 1. Pronotum as in *signoreti*, the callus of front lobe impressed at middle. Other characters as in key. Length, 5.5—6 mm. (Fig. 202*b*).

Raleigh, N. Car., April 29—Nov. 19 (*Brimley*). Plummer's Island, Md., Oct. 28 (*Gerhard*). Described from Indiana. Ranges from Quebec and New England west to Manitoba and Minnesota, and southwest to North Carolina. Uhler (1877, 433) calls it: "A sprightly species which inhabits uncovered dark rocks in the beds of running creeks and brooks. It flies from rock to rock and from its wariness and activity is quite difficult to capture."

1143 (1334). PENTACORA SPHACELATA (Uhler), 1877, 434.

Elongate, subelliptical. Above dull clay-yellow, tinged with dusky; vertex, middle of front lobe of pronotum and base of scutellum, blackish; elytra with part of disk and the membrane and veins fuscous; antennæ, beak, tibiæ and tarsi brownish-yellow; femora paler, mottled with purplish dots; under surface usually in great part black, shining, prosternum and meso- and metapleura pale yellow. Joint 1 of antennæ shortest, subclavate, 2 longest, subequal to 3 and 4 united, 4 one-third shorter than 3. Beak reaching between hind coxæ. Pronotum short, the callus of front lobe sharply defined both before and behind by an impressed line of fine punctures; hind margin less deeply concave than in allied species, the humeral angles less prolonged, their tips subtruncate. Length, 5—6 mm.

Ft. Myers and Marco, Fla., April (*Davis*). St. Augustine, Fla., January (*Gerhard*). A submaritime species occurring along the beaches of the Atlantic and Gulf coasts from Massachusetts to Texas. Uhler (1877, 435) mentions it as: "Exceedingly abundant on the discolored sandy and marshy brown spots of the tide-water districts of Massachusetts and Maryland. The salt mud seems to afford them the conditions best suited to their development in unnumbered multitudes." The dull clay-yellow hue and short setæ of elytra readily distinguish this form from its allies.

1144 (1317). PENTACORA HIRTA (Say), 1832, 34; I, 359.

Elongate-oval. Color above dull straw-yellow; a narrow forked median stripe between the eyes, the large median callus of front lobe of pronotum, three spots on hind lobe, scutellum except apex, and elytra except embolium, dark brown, shining; membrane fuscous, paler toward apex; under surface brown, thickly pubescent; prosternum and legs yellow, the latter thickly hirsute with erect dark hairs, the tibiæ with black spines. Antennal joints 1 and 2 dull yellow, the others darker, all beset with similar hairs, joints 3 and 4 subequal, united slightly longer than 2. Beak reaching hind coxæ. Pronotal collar with a transverse row of fine

punctures, the callus of front lobe prominent, impressed at middle. Length, 4.8—5.5 mm.

Ft. Myers, Everglade and Marco, Fla., April (*Davis*). South Amboy, N. J., Aug. 21 (*Gerhard*). Recorded also by Barber (1914, 499), as *Acanthia xanthechila limbosa* Horv., from Biscayne Bay and Lake Okeechobee, Fla. Described from Indiana. Ranges from Quebec and Connecticut southwest to Florida and Texas, but recorded from few stations. Bueno (1923, 411) says: "It seems to be one of the most abundant species of the genus in the east. It is commonly found on the muddy tidal flats and beaches of the Sound hunting around among the sedges." The *Salda pellita* Uhler, 1877, 433, is a synonym.

II. SALDA Fabricius, 1803, 113.

Rather robust ovate species having the head slightly prolonged behind eyes; tylus long, subvertical; beak reaching between the hind coxæ; pronotum with convex callosity of front lobe reaching basal third, bounded each side and behind by a deeply impressed line, its central fovea small, hind lobe flat; scutellum with a large median shallow central depression; corium with costal margin broadly curved; membrane distinct from the corium and with four cells, the inner one prolonged in front beyond the base of second. One introduced European species occurs in our territory.

1145 (1320). SALDA LITTORALIS (Linnæus), 1758, 442.

Rather broadly oval. Dull black, thickly clothed above and beneath with closely appressed yellow hairs, head with a few scattered longer black hairs; middle of tylus and tips of cheeks dull yellow; apical half of clavus with an oblong yellow spot; corium with a row of four yellowish spots between the first and second nervules, and one or two smaller ones on inner apical third; membrane pale brownish-yellow, the base and nervules darker, the cells with a transverse row of blackish spots; legs dull yellow, front femora with outer face blackish, middle and hind ones with one or two rows of brown spots; tarsi with joints 1 and 3 piceous, 2 and claws brownish-yellow; under surface shining black, thickly pubescent. Antennæ thickly pilose with deflexed blackish hairs; joints 1 and 2 brown, the base and tips darker, 3 and 4 black; 2 slightly shorter than 3 and 4 united, these subequal in length. Scutellum and basal lobe of pronotum finely crenate-punctate. Other characters as above given. Length, 5.5—7 mm.

Ranges in this country from Quebec and New York west to Illinois. Occurs also in Utah and on the Pacific slope. Recorded from Indiana by Van Duzee.

III. *SALDULA* Van Duzee, 1914a, 32.

This genus comprises the majority of the species formerly listed under *Acanthia* and *Salda*, the differences between the two genera being only those given in the key, p. 1004. Nineteen species⁹⁸ of *Saldula* are recognized by Van Duzee from North America, ten of which occur in the eastern states.

KEY TO EASTERN SPECIES OF *SALDULA*.

- a. Narrow side margins of pronotum yellowish; upper surface without erect hairs; corium and membrane largely pale, cells of latter with dark spots. 1146. *XANTHOCHILA*.
- aa. Side margins of pronotum black; upper surface with or without erect hairs.
 - b. Sides of pronotum curved.
 - c. Costal area of corium almost wholly black; upper surface black with a few pale spots; length, 6—8 mm. 1147. *MAJOR*.
 - cc. Costal area of corium white or yellowish, usually spotted with darker.
 - d. Upper surface of body with long erect hairs.
 - e. Form elongate-oval; surface shining; costal area with two elongate yellowish spots; length, 6—6.3 mm. 1148. *CONFLUENTA*.
 - ee. Form orbicular; surface dull, covered with a yellowish pubescence; entire costal area except base dull yellow; length, 3.5—4.5 mm. 1149. *ORBICULATA*.
 - dd. Upper surface of body without erect hairs; length less than 5 mm.
 - f. Pale spots of corium large, whitish, usually broadly joined to the marginal ones; elytra often mostly pale with ill-defined, vague brownish spots; tibiæ pale. 1150. *INTERSTITIALIS*.
 - ff. Pale spots of corium small, obscure, not joined to the marginal ones; costal area with one long median pale spot and a small one near apex. 1151. *SALTATORIA*.
 - bb. Sides of pronotum straight.
 - g. Upper surface of body with long erect hairs; corium black, except a small white spot near apex of costal area. 1152. *SEPARATA*.
 - gg. Upper surface of body without erect hairs.
 - h. Costal area of elytra either wholly pale or with large pale spots; middle and hind femora without brown dots.
 - i. Costal area entirely pale except at base, forming a regular yellowish stripe margined each side by a brownish nervure. 1153. *OPACULA*.
 - ii. Costal area with two long yellowish spots, the apical one paralleled within by a small, pure white oval one. 1154. *REPERTA*.

⁹⁸Of these *S. sphacellata* is above treated under *Pentacora*, while *pellita* (Uhler) is a synonym of *P. hirta*, and *pallipes* (Fab.), as recognized by American authors, is the same as *interstitialis* (Say). The record of the palearctic species *S. scotica* (Curt.) from "America Borealis," is too indefinite for its inclusion in this work.

hh. Costal area wholly dark, much widened and strongly reflexed; middle and hind femora each with two rows of brown dots.

1155. LITTORALIS.

1146 (1331). *SALDULA XANTHOCILA* (Fieber), 1859, 234.

Oblong-oval. Head, pronotum and scutellum black, tylus and lateral edges of pronotum yellowish; clavus black with a small oval spot near apex; corium in great part sordid white, its veins brown, costal area blackish, a pale spot near middle; membrane dull white, veins brown, three of the cells with median fuscous spots, a black spot opposite apex of inner cell; femora dull yellow, black beneath; tibiæ at base and tip, and first and third tarsals dark brown. Antennæ black, joint 1 in part yellow, as long as width of vertex; 2 two and a third times as long as 1; 3 and 4 subequal, united slightly shorter than 2. Upper surface clothed with very fine inclined blackish hairs. Length, 3.8—4 mm.

South France (*British Mus. Coll.*). A palæarctic European species known in this country from New England, New York, New Jersey, Colorado, Utah, Nevada and California. Not recorded from the states between New York and Colorado. A form from Connecticut and New Jersey, with sides of pronotum more broadly pale and length only 3 mm., is var. *limbosa* Horv. (1891, 80).

1147 (1323). *SALDULA MAJOR* (Provancher), 1872, 107.

Elongate-oval. Above a nearly uniform dull black, densely minutely shagreened, thickly clothed with a very fine yellowish pubescence; corium usually with six or eight small oblong whitish spots, two or three being near apex of costal area, the others on apical half of discoidal area; membrane dusky-white, clouded with fuscous at base and apex and with a small fuscous spot near middle of each cell; under surface black, more shining, less pubescent than above; femora and joints 3 and 4 of antennæ dark brown; coxæ, tibiæ, tarsi and basal joints of antennæ dull brownish-yellow. Joint 1 of antennæ stout, shorter than eye, 2 slender, 3 and 4 stouter, subequal, united slightly longer than 2. Beak reaching or slightly passing hind coxæ. Pronotum with sides feebly curved, their margins rather broadly flattened, slightly reflexed; hind margin broadly concave; humeral angles broad, flattened, truncate behind. Scutellum large, shallowly concave at middle. Basal two-thirds of costal margin of elytra strongly reflexed. Length, 6.5—8 mm.

Frequent about the lakes of northern Indiana, May—September; not taken south of Vigo County, where it was formerly common about the muddy margins of large ponds in the Wabash River bottoms (*W. S. B.*). Raleigh, N. Car., May 9 (*Brimley*). Rabun Co., Ga., July (*Davis*). Ranges from Quebec and New England west to British Columbia and Kansas, and south to Georgia. Recorded also from Texas and New Mexico. Easily

known by its large size and dull black color. The older records were listed as *S. deplanata* Uhl., a synonym.

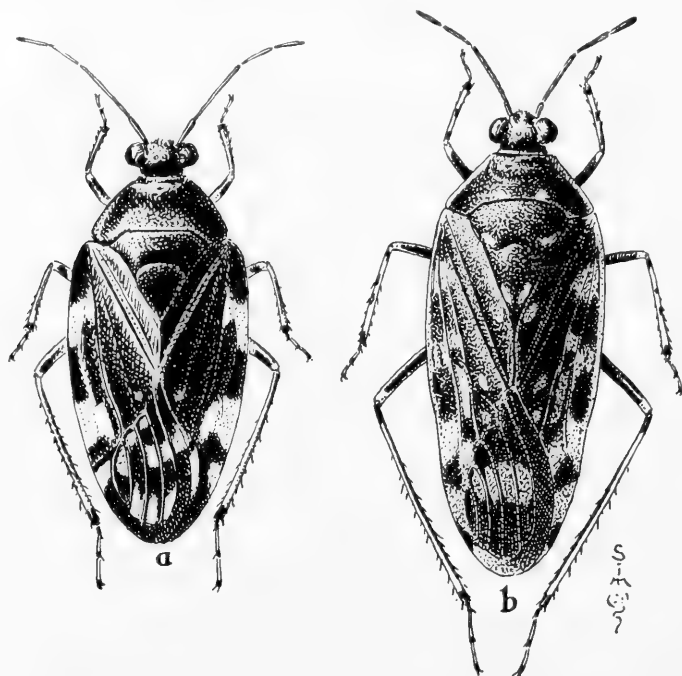


Fig. 202. *a*, *Saldula confluenta* (Say); *b*, *Pentacora ligata* (Say).
(After Drake, Tech. Publ. 16, N. Y. St. Coll. For.).

1148 (1324). *SALDULA CONFLUENTA* (Say), 1832, 35; I, 361.

Black, shining. Elytra with pale markings as in fig. 202, *a*; legs dull reddish-yellow, tip of tibiae and third tarsal blackish; beak reddish-brown, reaching between hind coxæ. Antennæ with joint 1 and basal two-thirds of 2 reddish-brown, remainder blackish; 1 as long as width of vertex, two-fifths as long as 2; 3 and 4 subequal, united one-fifth shorter than 2. Length, 6—6.3 mm. (Fig. 202, *a*).

Yaphank, Long Island, N. Y., July 4 (*Olsen*). Recorded only from Quebec, Connecticut, New York and New Jersey; sometimes listed as *S. confluent* (Say). Larger and more shining than most of its allies.

1149 (1325). *SALDULA ORBICULATA* (Uhler), 1877, 450.

Broadly ovate or orbicular. Black, hirsute with erect hairs and clothed with fine yellowish pubescence, shining where this is abraded; elytra with costal area, except base and a small spot at apex, dull yellow; corium with a pale submarginal spot near middle and with several vague bluish spots; membrane fuscous-brown, its margins paler; beak and legs dull yellow; antennæ fuscous-brown, the basal joint paler. Beak

reaching hind coxæ. Joints 1, 3 and 4 of antennæ subequal in length, each two-fifths the length of 2. Pronotum with curved median impressed line deep; side margins equally wide throughout, feebly reflexed; hind margin broadly, shallowly concave. Costal margin of elytra broadly curved from base to apex. Length, 3.5—4.5 mm.

Kosciusko Co., Ind., June 3; two specimens taken from the shore of Lake Tippecanoe. Ranges from New England west to the Pacific, but nowhere common. Not recorded southward except from Texas.

1150 (1328). *SALDULA INTERSTITIALIS* (Say), 1825, 324; II, 248.

Elongate-oval. Color variable, usually with head, pronotum, scutellum and basal fourth of elytra black, feebly shining, minutely scabrous and thickly clothed with a fine yellowish pubescence; remainder of elytra largely clay-yellow, the nervures and numerous vague spots or blotches fuscous; costal area yellow with two or three black spots, or black with yellow spots; membrane dull yellowish-white with dark nervures and an oblong dark spot in each cell; under surface black, shining, sparsely pubescent, the genital plate and hind margin of prosternum yellowish; joints 3 and 4 of antennæ fuscous-brown, the basal ones paler; legs dull yellow marked with vague brownish lines and dots. Beak piceous, reaching hind coxæ. Joint 1 of antennæ less than half the length of eye, 3 and 4 subequal, together slightly longer than 2. Pronotum sublunate, the callus of front lobe low, not prominent, impressed at middle; side margins slightly curved, feebly reflexed; humeral angles short, concave, truncate behind. Length, 4—5 mm.

Frequent throughout Indiana, May 21—Oct. 1. Ormond, Canal Point, R. P. Park and Dunedin, Fla., Nov. 28—March 28. Recorded by Barber from four other places in southern Florida. Taken in Indiana on wet sandy places along the shores of lakes and streams. Hibernates as imago beneath leaves and other cover near water. Occurs in Florida in all stages during the winter on the muck borders of small ponds and lakes. Ranges from Quebec and New England west to the Pacific, but in the south recorded only from Maryland, Florida and Texas. Bueno (1923, 414) says that: "Almost any collection of *Saldidæ* made in the eastern states on the shores of stream or pond, or among the sedges of the salt marshes, will number hosts of this common little species." The *S. pallipes* (Fabr.) of Uhler, Van Duzee and other American authors is now considered only a pale form of *S. interstitialis*.

1151 (1341). *SALDULA SALTATORIA* (Linnæus), 1758, 448.

Oblong-oval. Dull black with pale markings as in key; clavus with an oval spot near apex; membrane pale with an elongate dark spot in

each cell and a small one on outer margin; legs dull yellow, tips of tibiæ and third tarsal blackish. Joints 1 and 2 of antennæ brownish-yellow, 3 and 4 blackish; their relative lengths as in *confluenta*. Upper surface thinly clothed with fine appressed yellow hairs. Length, 3.8—4.2 mm.

England (*British Mus. Coll.*); "abundant everywhere in suitable places" (*China*). Recorded in this country from southern New England, New York and Illinois.

1152 (1329). *SALDULA SEPARATA* (Uhler), 1878, 432.

Oblong-oval. Dull black, clothed with both erect blackish hairs and fine appressed yellow ones; tylus and basal joint of beak dull yellow; membrane sordid white, veins and a vague spot in each cell fuscous-brown, a larger spot opposite apex of outer cell blackish; legs dull yellow, coxæ, tips of hind femora and tibiæ and third tarsal more or less fuscous; beak dark brown, reaching behind middle coxæ. Joint 1 of antennæ yellow, 2—4 blackish; 1 as long as width of vertex, 2 almost twice as long as 1, 3 slightly longer than 1, shorter than 4. Eyes of male very large. Length, 4—4.5 mm.

Nahant, Mass., July 7 (*Olsen*). Recorded from "Canada," New England and Pennsylvania.

1153 (1335). *SALDULA OPACULA* (Zetterstedt), 1838, 268.

"Elongate-oval. Black, sides of thorax strongly impressed. Scutellum and clavus with golden hairs, the latter with an obscure pale spot near apex; corium with a few obscure pale markings, its lateral margin, except at base and apex, narrowly testaceous; membrane obscure, its outer margin testaceous, nerves black, legs testaceous, apex of tibiæ and tarsi black; antennæ obscure. Length, $1\frac{1}{2}$ lines (3 mm.)."

The above is a copy of the original description. It is a palæarctic European species recorded in this country from Maine and Massachusetts.

1154 (1330). *SALDULA REPERTA* (Uhler), 1877, 447.

Oblong-oval. Dull black, thinly clothed with a fine yellowish pubescence; costal area black on basal fourth, a long yellowish spot on middle third and a shorter one near apex, the extreme tip black; clavus and corium with vague yellowish spots, the latter with a small oval white spot opposite the middle of the subapical yellowish one of costal area; membrane dirty white, its veins and base dusky, a brownish oblong spot in each cell; legs in great part brownish-yellow, knees and tarsi darker; under surface black, thickly clothed with rather long grayish hairs. Joint 1 of antennæ pale above, remaining joints brown, their relative lengths as in *interstitialis*. Pronotum with sides straight and converging from base to apex, the callus of front lobe shorter, wider and with a more distinct median impression than in *interstitialis*. Length, 4—4.5 mm.

Marion Co., Ind., Sept. 9. Dunedin, Lakeland, Utopia and Canal Point, Fla., Dec. 4—March 26 (*W. S. B.*). Frequent

about Dunedin in spring along the mucky margins of small ponds. Mosholu, N. Y., April 24 (*Olsen*). Stan Lake, N. Hamp. (*Davis*). Recorded heretofore only from Quebec, New Hampshire and Massachusetts. Resembles *interstitialis*, but distinguished by the much larger dark area of elytra, the well defined pale spots of costal area with white spot in the dark area near apex of corium, and the straight margin of pronotum.

1155 (1320). *SALDULA LITTORALIS* (Linnæus), 1758, 442.

Oboval, distinctly widened behind, more so in female. Dull black, opaque, thickly clothed with very fine appressed yellow hairs; tylus and base of cheeks dull yellow; corium wholly dark, or with a vague pale spot opposite tip of clavus and a row of three or four others between the main nervures; membrane dull yellow, veins deep black, cells each with a vague fuscous spot at base and middle; legs dull yellow, front femora blackish beneath, middle and hind ones as in key; spines and tips of tibiæ blackish; joints 1 and 3 of tarsi fuscous, 2 yellowish. Joints 1 and 2 of antennæ dull yellow, 3 and 4 fuscous-black; 1 slightly shorter than width of vertex, 2 two and one-third times longer than 1; 3 and 4 subequal, united slightly longer than 2. Length, 5.5—7 mm.

Kent, England (*British Mus. Coll.*). Recorded in this country from Quebec, New York, Indiana, Illinois, Utah and California.

IV. MICRACANTHIA Reuter, 1912, 8, 16.

The members of this genus are distinguished from those of *Saldula* mainly by the absence of corial veins. They are smaller in size and have the interocular area more narrow; sides of pronotum straight, strongly converging; elytra conjointly more tectiform; cells of membrane four, subequal in length. One of the two known species occurs in the eastern states, the other in California.

1156 (1342). *MICRACANTHIA HUMILIS* (Say), 1832, 35; I, 360.

Oval or oblong-oval. Head, pronotum and scutellum black, more or less shining, minutely scabrous, thinly clothed with fine yellow appressed hairs; clavus and inner portion of corium velvety black, the former usually with a minute white spot near apex, the latter with two similar spots on outer margin and usually a third near middle of apex; embolium or costal area dull white with tip fuscous and an oblong black projection of corium near its middle; membrane dull white with veins and one or two small median spots in each cell fuscous-brown; antennæ, except basal joint, beak and apical half of femora dark brown; lower part of face and basal half of femora pale yellow; tibiæ and tarsi brownish-yellow, annulate with paler. Beak reaching hind coxæ. Joint 1 of antennæ half the length of 2, 3 and 4 subequal, each slightly shorter than 2. Pronotum with callus of front lobe foveate at middle; hind margin broadly and shallowly concave. Length, 3—3.7 mm.

Lake, Laporte and Marshall counties, Ind., May 2—Oct. 6; frequent along the margins of Lake Michigan and Lake Maxinkuckee; also at light. Palmdale, Miami, R. P. Park, Ft. Myers and Dunedin, Fla., December—April. Taken beneath cover and by sweeping low herbage along the margins of ponds. Known heretofore in that State only from Jacksonville and northern Florida. Raleigh, N. Car., late April (*Brimley*).

This is our smallest eastern Saldid and varies much in size and somewhat in color, the southern examples averaging much smaller and more often without the pale apical spot of corium than those from Indiana. Its known range extends from Ontario and New England west to the Pacific and southwest to Florida and Texas. Uhler states that it is: "Common in Maryland, within the limits of the metamorphic belt, upon damp sand formed by the disintegration of the rocks near creeks and brooks in June and July."

V. LAMPACANTHIA Reuter, 1912, 9, 21.

Medium sized strongly shining subglabrous black or piceous species having the head distinctly broader across eyes than front margin of pronotum; beak reaching hind coxæ; joint 2 of antennæ as long as 3 and 4 united; pronotum subconical, the front lobe longer than hind one, its side margins strongly converging from the base, deflexed in front of middle, hind margin feebly concave; elytra at most surpassing abdomen by one-fourth the length of membrane, convex, subtectiform and coriaceous throughout; membrane, when present, with four cells, which increase in length from the outer side. Three species are known, all occurring in our territory.

KEY TO EASTERN SPECIES OF LAMPACANTHIA.

- a. Upper surface without erect hairs; hind angles of pronotum not acutely produced; antennæ brownish-yellow or piceous, joints 3 and 4 not fusiform.
- b. Membrane present, its cells distinct; form broad, the elytra at middle more than one-half wider than base of pronotum; legs in part piceous. 1157. CORIACEA.
- bb. Membrane absent; form narrow; elytra strongly tectiform, at middle about one-third wider than base of pronotum; legs yellow. 1158. ANTHRACINA.
- aa. Upper surface with numerous erect hairs; hind angles of pronotum acutely produced; joints 1 and 2 of antennæ yellow, 3 and 4 black, fusiform, strongly swollen. 1159. CRASSICORNIS.

1157 (1321). *LAMPACANTHIA CORIACEA* (Uhler), 1872, 421.

Elongate-oval, male; broadly oval, female. Black or piceous-black, shining; head, pronotum and scutellum minutely scabrous; antennæ piceous-brown, the second joint sometimes paler; femora in great part piceous, female, largely yellow, male; coxæ, tibiæ and tarsi brownish-yellow with tips and spines piceous. Beak reaching hind coxæ. Antennæ with scattered bristles, joint 1 stout, subclavate, 2 slender, nearly three times as long as 1, 3 and 4 subequal, stouter than 2. Pronotum subtrapezoidal, side margins flattened and reflexed to apical third, then evanescent and deflexed; front lobe twice as long as hind one, its callus large, foveate at middle; hind margin broadly very shallowly concave, its lobes obtusely angled. Scutellum large, its middle broadly and shallowly concave. Elytra at base not much wider than base of pronotum, thence broadly curved with margins wide and reflexed to apex; disk vaguely coarsely and sparsely punctate, its divisions feebly differentiated; membrane relatively small,

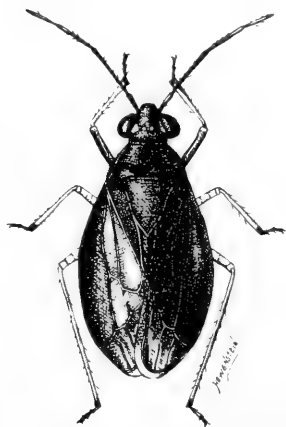


Fig. 203. X 6. (After Lugger).

declivent, of much the same texture as corium. Sixth ventral, female, obtusely triangular, convex, covering the genitals, its side margins sinuate and apex broadly rounded. Genital plate of male obovate, strongly convex, clothed with rather long yellow hairs. Length, 6—7 mm. (Fig. 203).

Steuben, Kosciusko and Marshall counties, Ind., June 5—July 6; taken in numbers beneath logs at the edge of a marsh near Lake Tippecanoe (*W. S. B.*). Long and Staten Island, N. Y., May—July (*Davis*). It is a species of the Transition Life Zone, ranging from Ontario and New England west to British Columbia, Colorado and Utah. Not recorded south of New Jersey. Where found it occurs along the margins of tamarack bogs and marshes, either beneath cover or running about between the roots of sedges and grasses.

1158 (1322). *LAMPACANTHIA ANTHRACINA* (Uhler), 1877, 438.

Narrowly oval. Color of *coriacea*; antennæ dull yellow at base, dusky beyond; legs wholly yellow, the last joint of tarsi and tips of tibia dusky. Interocular area and pronotum narrower than in *coriacea*, the latter subconical, its front lobe less convex, three times as long as hind one. Joint 2 of antennæ twice as long as 4, slightly shorter than 3. Scutellum flat, its basal half distinctly irregularly rugose. Elytra conjointly oval, strongly convex, "arched and decurving over the body like the shell of a terrapin" (*Uhler*); clava and coria distinct, surface im-

punctate; membrane absent, but elytra surpassing abdomen as much as in *coriacea*. Length, 5.5—7 mm.

Spring Hill, Ala., April 29 (*Gerhard*). Described from Pennsylvania. Recorded elsewhere only from New Hampshire, New York and Michigan. Bueno (1923a, 151) regards it as the brachypterous form of *coriacea*, but the length of the elytra and the yellow legs preclude this supposition.

1159 (1345). *LAMPACANTHIA CRASSICORNIS* (*Uhler*), 1877, 438.

Narrowly oval, convex. Black with a faint brassy tinge, strongly shining; color of antennæ as in key; legs pale brownish-yellow, the tips of tibiæ and tarsi piceous. Beak pale piceous, reaching hind coxæ. Antennæ short, relatively stout, bristly hairy; joint 1 one-third the length of 2, the latter slender, 3 and 4 much stouter, fusiform, subequal. Pronotum subcampanulate, its hind lobe very short with angles suberect, acute, somewhat divergent; callus of front lobe large, strongly convex, reaching the side margins, limited before and behind by a deeply impressed punctate line. Elytra conjointly elongate-oval, not wider at base than pronotum, disk strongly convex, minutely irregularly punctate, each puncture with a long, erect black hair; membrane absent; corium and clavus scarcely differentiated; tips separately narrowly rounded, distinctly surpassing abdomen. Genital plate of male as in *coriacea*; sixth ventral of female with apex truncate. Length, 4—4.7 mm.

Kosciusko Co., Ind., June 7—9; four specimens taken from a mass of fine shells thrown up by the waves on the shore of Lake Tippecanoe. Described from the Saskatchewan River; recorded elsewhere only from New Hampshire and New York. This and *coriacea* are but two of many boreal forms of Heteroptera and Coleoptera of the Hudsonian and Transition Life Zones which occur among the bogs and lakes of the northern third of Indiana.

VI. *CHARTOSCIRTA* Reuter, 1895a, 5, 54.

Small oval, opaque, pubescent species having the head one-half wider than long, the vertex with a deep sulcus; beak surpassing middle coxæ; pronotum twice as wide at base as long at middle, hind margin deeply concave, callus extending behind middle of disk, and with a deep median fovea; scutellum as broad as long; elytra conjointly oval, broadened behind, surpassing abdomen, veins obsolete except claval suture and main costal vein; membrane with four cells, the two middle ones narrow, fourth widest; legs long and slender, front and middle tarsi with joints 2 and 3 subequal, hind tarsi with joint 3 three-

fourths the length of 2. One species is known in this country. Bueno (loc. cit.) founded for it the subgenus *Chartolampira*.

1160 (—). CHARTOSCIRTA (CHARTOLAMPRA) CURSITANS Bueno, 1923a, 151.

Head, pronotum and scutellum black; elytra piceous, opaque, with a few scattered yellowish spots; membrane yellowish with darker cloudings; legs brownish, paler at base. Antennæ reaching beyond apex of scutellum, joints 3 and 4 of equal thickness; 1 shortest and stoutest; 2 four and one-half times as long as 1; 3 and 4 subequal, united slightly longer than 2. Pronotum behind the callus and apical portion of scutellum irregularly transversely rugose. Elytra clothed with short gray sericeous hairs. Last ventral of female as long at middle as the three preceding united. Length, male, 4.1; female, 4.6 mm.

Described from Lake Tear, Mt. Marcy, Essex Co., N. Y. Known only from there.

VII. SALDOIDA Osborn, 1901, 181.

Small, oblong-oval, subglabrous species, the differential characters as in generic key and having the antennæ short, stout, joint 3 equal to or longer than and three times as thick as 2, 4 shorter than and about one-half as thick as 3; pronotum subcampanulate, with front lobe narrow, subcylindrical, armed with two conical tubercles, hind lobe short, broadly and shallowly concave behind; scutellum large, flat, its apex acute; elytra entire, conjointly tectiform, the corium without veins; membrane large, distinct, surpassing abdomen by two-thirds its length. Two species are known, both only from Florida.

KEY TO SPECIES OF SALDOIDA.

- a.* Hind angles of pronotum obtuse; color pale brown marked with reddish-yellow and black. 1161. SLOSSONI.
- aa.* Hind angles of pronotum prolonged, subacute; color black, the elytra in great part reddish-brown. 1162. CORNUTA.

1161 (1346). SALDOIDA SLOSSONI Osborn, 1901, 181.

Head with vertex black, margins next to eyes reddish-brown, front and beak testaceous; pronotum with tubercles reddish-brown, front margin and band behind tubercles black, posterior lobe brownish-yellow; scutellum black, apex piceous-brown; elytra pale brown, claval suture and apical margin of corium black; corium with two triangular whitish spots, the bases of which merge into the hyaline costal margin; membrane fuscous at base, hyaline toward apex; legs yellowish-brown, apical third of femora, base and apex of tibiæ and third tarsal, fuscous. Other characters as under genus heading. Length, 3 mm.

Known only from Punta Gorda and Belleaire, Fla.

1162 (1347). *SALDOIDA CORNUTA* Osborn, 1901, 182.

Head, third joint of antennæ, pronotum, scutellum, claval sutures, apex of corium and under surface, dark chestnut-brown or black; hind angles of pronotum, corium, except apex and costal area, and clavus reddish-brown; costal area and margin of corium white; membrane dusky, paler at middle; coxæ, basal half of femora and apex of last ventral, whitish-yellow; beak and remainder of legs reddish-brown. Beak reaching hind coxæ. Joints 1, 2 and 4 of antennæ dull yellow, subequal in length; 3 two-fifths longer, and strongly swollen. Scutellum with basal two-thirds finely rugose, remainder smooth. Other characters as under generic heading. Length, 2.5—3 mm.

Dunedin, Fla., March 13; one specimen taken from beneath a chunk on the margin of a pond. Recorded only from Punta Gorda and Bellaire, Fla. At the latter place, only four miles south of Dunedin, Mrs. A. T. Slosson, who collected the types of both species of *Saldoidea*, found both associated with ants, and (1908, 424) has given a most interesting account of her search for them, from which I quote:

"The little creatures have quaint ways of their own not at all ant-like. Their long, conspicuous antennæ are waved from side to side as they run swiftly about. They never, as far as I know, leap except when startled. Finding that the most likely spots were damp, grassy places, especially where the little sun-dew (*Drosera*) was growing, I frequented such localities. The *Saldoidea*s were apparently often in hiding among the low grass and herbage. To start them out I pulled up the plants by the roots. This would often send out a swiftly running little imp, waving his long antennæ as he went.

"But to recognize this insect is one thing, to capture it is quite another. I lost many, more, I think, than I secured. I tried varying methods, the most successful one being the holding my net near the prey and 'shooing' the spry little fellow into it. But this often failed. However, I succeeded in securing some half dozen specimens, full grown and perfect, with a few others which were either injured or immature. Whether the association of *Saldoidea* with ants is accidental I cannot say. I only know that I never found one except in their company. But again I never saw either ant or *Saldiid* take the slightest notice of one another or seem conscious of each others' presence."

Suborder II. CRYPTOCERATA Fieber, 1851.

THE AQUATIC HETEROPTERA.

"A pond's a mirrored world, where strong on weak,
Cunning on simple prey."

It has been well said that: "Insects are essentially creatures of the earth and air," but many species have become adapted to an aquatic life, some spending only their immature stages in

the water, others living therein throughout most of their days, quitting it only to extend their foraging grounds through flight. Those Heteroptera which are mainly aquatic in habitat belong to the suborder Cryptocerata, so named from their having the antennæ present but usually very short and concealed in grooves or cavities on the under side of the head (fig. 207, *b*). In addition they have the texture of the body largely coriaceous and usually devoid of pubescence; front legs more or less raptorial or fitted for grasping and holding prey; middle and hind ones often greatly modified for rapid swimming, the hind coxæ being broad, more or less flattened and usually hinged to the metasternum, the hind femora often flattened and grooved for the reception of the tibiæ in repose, both femora and tibiæ often fringed with hairs.

To the suborder, as thus briefly defined, belong seven families, separated as follows:

KEY TO FAMILIES OF SUBORDER CRYPTOCERATA.

a. Ocelli present; hygrophilous; predaceous.

b. Antennæ exposed; front and middle legs similar; hind tarsi 2-jointed; beak reaching or surpassing hind coxæ.

Family XXXIV. OCHTERIDÆ, p. 1020.

bb. Antennæ concealed; front legs raptorial; eyes protuberant; beak very short, concealed by front femora.

Family XXXV. NERTHRIDÆ, p. 1022.

aa. Ocelli absent; aquatic; usually predaceous.

c. Hind tarsi with two distinct claws; beak 3-jointed.

d. Membrane of elytra without veins.

Family XXXVI. NAUCORIDÆ, p. 1029.

dd. Membrane with reticulate veins.

e. Apical appendages of abdomen long and slender, not retractile; tarsi 1-jointed; hind coxæ rotatory; body usually long and very slender.

Family XXXVII. NEPIDÆ, p. 1032.

ee. Apical appendages of abdomen short and flat, retractile; tarsi 2-jointed; hind legs distinctly flattened, the coxæ hinged; body broad and flat.

Family XXXVIII. BELOSTOMATIDÆ, p. 1041.

cc. Hind tarsi without distinct claws.⁹⁹

f. Base of head inserted in thorax; front tarsi 2-jointed, of males sometimes 1-jointed; body convex and obtusely keeled above, so that they swim back downward; predaceous.

Family XXXIX. NOTONECTIDÆ, p. 1048.

ff. Base of head overlapping apex of pronotum; front tarsi 1-jointed, palæform; body subdepressed above, so that they swim normally; apical ventrals of male asymmetrical; phytophagous, feeding on aquatic plants.

Family XL. CORIXIDÆ, p. 1062.

⁹⁹Except in the genus *Plea*, whose members are less than 3 mm. in length.

Family XXXIV. OCHTERIDÆ Kirkaldy, 1906, 149.

THE VELVETY SHORE BUGS.

Small oval, velvety bluish or black littoral Heteroptera, formerly classed with the Nerthridæ. They have the upper surface subconvex, relatively smooth; head narrow, elongate, its front declivent; eyes oblique, strongly convex, their inner basal half concave, the concavity filled by a lobe of the vertex; ocelli present; beak long, reaching or surpassing hind coxæ, its basal joint very stout, remainder very slender; antennæ 4-jointed, shorter than head, not concealed in repose; pronotum subtrapezoidal, its sides moderately flattened, hind margin sinuate; scutellum large, triangular; elytra normal, covering the abdomen, its divisions all distinct, the cells of the membrane with cross veins; legs slender, subequal in length, all cursorial; front and middle tarsi 2-jointed, hind ones 3-jointed, the basal joint in all very short.

About a dozen species of the family are known, seven from North America. In structure and habits they form a sort of connecting link between the Saldidæ and Nerthridæ, living as do the members of those families amongst the grass and weeds on the margins of brooks and ponds. Of them Uhler says: "Their rostrum is a dreadful instrument, sharp as the finest needle, extremely thick and stout at base and a deadly probe to the larvæ of horse-fly or other insect which lives on the surface of the ground in situations near water." The principal literature pertaining to them is by Uhler, 1876, 1884; Stal, 1876; Champion, 1901; Barber, 1913.

I. OCHTERUS Latreille, 1807, 142.

This, the only genus of the family represented in this country, is sufficiently characterized above. Three of the five North American species occur in the eastern states.

KEY TO EASTERN SPECIES OF OCHTERUS.

- a.* Clavus concolorous with the corium.
- b.* Side margins of pronotum with a small pale spot near front angle; membrane of elytra broad, normally developed. 1163. AMERICANUS.
- bb.* Side margins of pronotum wholly pale; membrane of elytra long and narrow. 1164. BANKSI.
- aa.* Clavus wholly yellow. 1165. FLAVICLAVUS.

1163 (1412). *OCHTERUS AMERICANUS* (Uhler), 1876, 335.

Oblong-oval. Above velvety black, more or less mottled with small irregular bluish spots and sparsely beset with very short golden-yellow prostrate hairs; corium usually with five small submarginal yellow spots; beneath with sterna bluish-black and ventrals dull brownish-yellow, thickly and finely pubescent; legs paler yellow; beak reddish-yellow, reaching second ventral. Front of head oblong, minutely transversely rugose, its apex broadly rounded, somewhat flattened; vertex with a fine median longitudinal carina. Joints 1 and 2 of antennæ pale, 3 and 4 fuscous; 1 very short, cylindrical, 2 twice as long, subclavate, 3 and 4 subequal, sparsely hirsute, each twice as long as 2. Pronotum slightly more than two and one-half times as wide as long, its sides slightly converging from base to near apex, then feebly curved, the front angles sub-angularly rounded, the area just behind them flattened and reflexed. Length, 4.5—5 mm.; width, 2.5—2.8 mm.

Dunedin, Ft. Myers and Moore Haven, Fla., Nov. 26—April 26 (*H. S. B.*). Staten Island, N. Y., and Lakehurst, N. Jer., September (*Davis*). Frequent along the mucky margins of ponds near Dunedin and often taken by sweeping low herbage in such places. It is an active leaper, jumping a foot or more when disturbed or while in the sweep-net. Its known range extends from Massachusetts and New York west to Illinois, Nebraska and Kansas and southwest to Florida, Texas, Arizona and Cuba. The blue hue of the spots above and of the sterna below appears to be a kind of "bloom," as it is easily abraded.

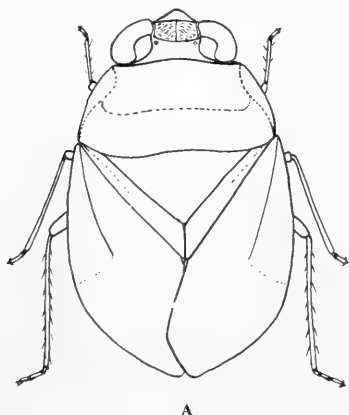


Fig. 204, X 10. (After Garman in Hemiptera of Connecticut).

1164 (1413). *OCHTERUS BANKSI*
Barber, 1913, 214.

Slightly broader than *americanus*. General color above paler brown but otherwise much the same, the bluish spots usually less evident; entire reflexed side margins of pronotum and the basal and apical thirds of costal margin of elytra, dull translucent yellow; under surface and legs of the same color as in *americanus*. Front of head wider and with three entire carinæ, the median one more prominent at apex of tylus, the lateral ones subsinuate. Pronotum about twice as wide as long, side margins feebly curved from base to apex, the front angles rounded, the margins more broadly flattened and reflexed, especially in front, than in *americanus*; disk shallowly transversely sulcate behind the middle, sparsely rather coarsely punctate, the punctures usually concealed; median portion of front lobe elevated and with two or three fine vague transverse lines. Scutellum equilateral, sparsely coarsely punctate and

with a transverse median groove. Elytra with membrane narrow, feebly differentiated from corium, but slightly overlapping. Length, 4—4.5 mm.; width, 2.2—2.5 mm. (Fig. 204).

Marshall and Fountain counties, Ind., June (*H. S. B.*). Fairfax Co., Va., June 26 (*Davis*). Described from Virginia and recorded heretofore only from that State and New York.

1165 (1414). OCHTERUS FLAVICLAVUS Barber, 1913, 215.

Oblong-oval, smaller than *americanus*. Color as there except that the entire clavus is pale dull yellow, yellow spot behind front angles of pronotum smaller and submarginal spots of corium wanting. Pronotum with sides less reflexed, more converging, front angles rounded, front margin narrower than width across eyes; disk more uneven, humeral angles subrectangular. Length, 3.5 mm.; width, 2 mm.

Sarasota, Fla., March 2; one female taken from beneath the decaying stems of pickerel-weed growing in the muck of a nearly dry wet-weather pond in open pine woods. Known heretofore only from the unique male type taken by Mrs. A. T. Slosson at Ormond, Fla.

Family XXXV. NERTHRIDÆ Kirkaldy, 1906, 149.

THE TOAD BUGS.

Small squat, very compact, littoral Heteroptera having the front of head subvertical; eyes bean-shaped, prominent, usually directed upward and outward; ocelli present, sometimes indistinct; antennæ 3- or 4-jointed, in repose concealed in a cleft beneath the eyes; beak short, stout, 4-jointed, usually concealed by the stout front femora; pronotum much wider than long, its disk very uneven; scutellum triangular, its disk when visible, also uneven and granulate; elytra in great part or wholly coriaceous, its divisions often ill-defined; membrane when present very short, without visible veins; connexivum usually narrowly exposed behind the middle; front legs raptorial, their femora strongly swollen, broadly grooved for the reception of the tibiæ and 1-jointed tarsi, the margins of the groove denticulate; middle and hind legs longer and more slender, their femora not grooved and tibiæ and tarsi beset with numerous inclined spine-like setæ; middle tarsi 1-jointed, hind ones 3-jointed, the basal joint often very short, tarsi with two claws; mesosternum with a slender, more or less compressed subrect elevation.

The members of this family are littoral in habits, dwelling

along the moist muddy, mucky or sandy margins of streams, lakes and ponds, where their harmonizing colors protect them from their enemies and where they feed upon the young of other animal forms which live with them a littoral life. Only about 25 species of the family are known, mostly from tropical America. Of these, six, representing two subfamilies and three genera, occur in the eastern states. The principal literature treating of them is by Say, 1832; Stal, 1876; Uhler, 1884; Champion, 1901; Bueno, 1905e, 1923; Hungerford, 1920, 1923c, and Blatchley, 1925.

KEY TO EASTERN GENERA OF NERTHRIDÆ.

- a. Front tarsi with two claws; elytra with clavus, corium and membrane present; eyes large, prominent, subpedunculate. (Subfamily Gelastocorinæ). I. GELASTOCORIS, p. 1023.
- aa. Front tarsi with a single claw; elytra wholly coriaceous, with divisions not differentiated, the membrane absent; eyes small, sessile, not prominent. (Subfamily Nerthrinæ).
 - b. Elytra not soldered together along the middle line, their suture distinct and disk without lines of elevations; scutellum strongly narrowed apically to form a tongue-like wedge between the bases of elytra; margins of abdomen coarsely crenate. II. GLOSSOASPIS, p. 1026.
 - bb. Elytra soldered together along the median line, their suture indistinct and disk roughened with oblique lines of short acute elevations; scutellum broadly triangular, its apex obtuse; margins of abdomen entire. III. NERTHRA, p. 1028.

I. GELASTOCORIS Kirkaldy, 1897b, 258.

In addition to the characters above given, the members of this genus have the body thicker in front than behind, finely and densely granulate above; front of head triangular and vertical; eyes with inner and lower sides concave, the inner concavity filled by a lobe of the vertex; pronotum with sides strongly sinuate, front angles expanded, concave beneath, forming with the lower concavity of eye a pocket for the reception of the antennæ; front and hind margins of pronotum strongly sinuate, disk of both pronotum and scutellum with oblong ridges or blunt tubercles; inner margins of elytra sinuate or curved and strongly overlapping, the membrane ill-defined, base of outer margin of corium widened and flattened; ventral segments strongly narrowed at middle. Genital plate of male asymmetrical, curved to the right; middle of sixth ventral of female strongly convex. Four species are known from our

territory.¹⁰⁰ They were long listed under the generic name *Galgulus*, which was preoccupied.

KEY TO EASTERN SPECIES OF *GELASTOCORIS*.

- a. Front of head below eyes as wide or wider than long; claws of front legs contiguous, shorter than the tarsal joint, the claws and tarsus united one-half as long as the tibia; second joint of hind tarsi about one-third longer than third; general color clay-yellow, clouded medially with fuscous-brown or black; form broadly oval. 1166. *OCULATUS*.
- aa. Front of head longer than its greatest width; claws of front legs approximate but not contiguous, longer than the tarsal joint, the claws and tarsus united three-fourths as long as tibia; general color dark with white or gray markings.
 - b. Edge of lateral expansion of base of corium entire; connexivum broadly exposed, the basal half of each segment black; second joint of hind tarsi about one-half longer than third; form broadly oval. 1167. *BARBERI*.
 - bb. Edge of lateral expansion of base of corium denticulate; connexivum narrowly or not at all exposed; second and third joints of hind tarsi subequal in length.
 - c. Pale spots on elytra not well defined; sides of front half of pronotum not subparallel; form oblong-oval. 1168. *SUBSIMILIS*.
 - cc. Pale spots on elytra prominent, well defined; sides of front lobe of pronotum subparallel; form broadly oval. 1169. *VARIEGATUS*.

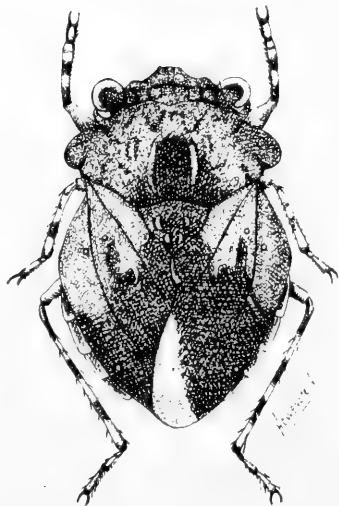


Fig. 205, X 6. (After Lugger).

1166 (1407). *GELASTOCORIS OCULATUS* (Fabricius), 1798, 525.

Broadly oval, subdepressed. General color above dull clay-yellow, sometimes nearly uniform, more often with the middle of pronotum, scutellum and apical half of elytra fuscous-black or -brown; under surface in great part fuscous, the sides paler; legs dull yellow more or less distinctly annulate with fuscous; spines of tibiae and tarsal claws piceous-brown; expanded flanks of pronotum dull ivory-white beneath. Eyes divergent outwardly. Front lobe of pronotum convex at middle and with five or six irregular ridges or tubercles, two or more of these extending back onto hind lobe; humeral angles expanded and broadly rounded. Scutellum short, with an obtuse median ridge and a tubercle each side. Elytra slightly surpassing tip of abdomen; edge flattened basal expansion of corium crenulate. Connexivum narrowly exposed, the

¹⁰⁰Champion (1901, 349) lists *G. vicinus* Champ., a neotropical species, from "Southern and Western United States," but there is no definite record of its occurrence east of the Mississippi.

hind angle of each segment slightly prolonged. Length, 7.5—9 mm.; width, 5—6 mm. (Fig. 205).

Common throughout Indiana, apparently more so in the northern counties. Occurs throughout the year, both adults and the larger nymphs hibernating in cavities in the mud or muck along the margins of streams and lakes. Arch Creek, R. P. Park, Sarasota and Dunedin, Fla., December—April. Barber records it from a dozen or more stations in that State. Its recorded range extends from "Lower Canada" (Uhler, 1884) and New England west to the Pacific and southwest to Florida, Arizona, Mexico and Central America, but many of these records doubtless refer to other species. Uhler (1884, 263) calls it: "A variously tinted chunk of insect entity," and likens its form to that of "an Indian hoe or stone skin-dresser." He says:

"They may often be seen in the month of May walking about between the stones on the low banks of brooks and streams where *Tettix* and *Batrachidea* (grouse-locusts) abound, watching an opportunity to seize one of these insects, and when the favorable moment arrives, leaping suddenly upon one of them, clasping it with tight embrace between the front femora and tibiae and then sucking out all its vital juices. It leaps with extraordinary facility, and in this way often eludes its pursuers by alighting on spots which almost exactly match its colors."

Hungerford (1923c, 167) states that the eggs are laid in the sand, hatch in twelve days, pass through five instars and reach maturity in 47 to 89 days from egg to adult, or 60 to 100 days for total development.

1167 (—). *GELASTOCORIS BARBERI* Bueno, 1923, 393.

Broadly oval. Upper surface variegated with black, bronze and blue, thickly beset with small white tubercles, giving it a shagreened aspect; legs dull white touched with brown, spines black. Eyes prominent, inclined forward. Pronotum two and three-fifth times broader than long, basal three-fourths of side margins rounded, converging in front, subangulate at middle; disk convex, the median obtuse tubercles prominent; scutellum convex, wider than long. Elytra not passing abdomen, their tips broadly rounded; membrane very short. Front femora shorter than tibiae and tarsi united, grooved, edges of groove spinose; middle femora three times as thick and longer than tibiae; hind legs longest, their femora not spined, tibiae longer than femora, beset with long setae. Length, 6.3 mm.

Known only from the single male type taken Oct. 16 at Muncie, Ill.

1168 (—). *GELASTOCORIS SUBSIMILIS* sp. nov.

Oblong-oval. Above dark fuscous-brown to steel-gray, the elytra more or less mottled with large silvery-gray spots and smaller black

ones, the granules often in part metallic yellow; under surface in great part bluish-black, the prosternum, pleura of meso- and metasterna and genital plate, in part or wholly, ivory-white; legs dull white distinctly annulated with fuscous-black; beak, tarsal claws and spines of tibiæ black. Eyes less divergent than in *oculatus*. Pronotum with side margins of front lobe less deeply sinuate; humeral angles less broadly expanded, their apex obtusely angled; disk of front lobe less uneven, the ridges broader and lower. Elytra very slightly surpassing abdomen. Connexivum narrowly exposed, the edges of its segments even, the hind angles not prolonged, each bearing a tuft of long grayish hairs. Other characters as in key. Length, 6.5—7.5 mm.; width, 4—4.5 mm.

Ormond, Dunedin, Sarasota, Ft. Myers, Bassenger, R. P. Park and Moore Haven, Fla., November—April. Occurs on the flats along the margins of lakes and wet-weather ponds. Much more common in southern Florida than *oculatus* and distinguished by its smaller, more oblong form, darker general color with spots of silvery-gray and metallic granules, narrower head, less deeply sinuate margins of pronotum, more narrowly exposed connexivum, longer front tarsal claws, etc. As in *oculatus* the color is variable, depending upon that of its local habitat, but the legs are always paler and the surface tinged with bluish.

1169 (1409). *GELASTOCORIS VARIEGATUS* (Guerin), 1844, 352.

Broadly oval. Above bronzed brown with a metallic tinge; sides of pronotum and elytra with prominent spots of silvery-gray scales, a large spot of similar scales on middle of basal half of pronotum; inner half of corium and costal area each with a subquadrate black spot near middle; legs annulate with black and white; abdomen black; flanks of sterna and genital plate white. Sides of pronotum deeply sinuate, those of front half nearly straight and subparallel; of posterior half foliaceous, finely crenate in front, the humeral angles obtuse. Connexivum wholly concealed, male, narrowly exposed, female. Length, 6—7 mm.

Dunedin, Fla., Jan. 2. One pair taken from beneath a log close to the water's edge on the bay beach. A prettily marked and widely distributed species ranging, according to Uhler and Champion, from Maryland, Florida and Texas south and west throughout Mexico, the West Indies, Central and South America.

II. *GLOSSOASPIS*¹⁰¹ Blatchley, 1925, 50.

Small broadly oval or subquadrate species having the head immersed in thorax to eyes, vertex very short, front vertical,

¹⁰¹From the Greek *glossa*, "tongue," and *aspis*, "shield," referring to the tongue-like apical portion of scutellum.

the front of body therefore appearing as if truncate or squarely cut off; eyes small, reniform; ocelli distinct, each set on a small interocular tubercle; pronotum short, very broad, the disk with median portion convex, uneven, sides strongly flattened; elytra wholly coriaceous, closely united along a median straight line, the usual divisions wanting, the costal margins expanded near base to form a short broadly rounded lobe; scutellum with basal portion very short, nearly one-half as wide as pronotum, separated from the much narrower apical portion by a sinuate transverse groove, the apical portion forming a tongue-like wedge between the bases of elytra, its apex narrowly rounded; front legs short, femora very stout, broadly and shallowly grooved, the front margin of groove evenly widened and armed with a row of numerous close-set, very short denticles, the hind margin of groove scarcely raised; front tibiæ slender, cylindrical, feebly curved, the tarsal joint very short, the long curved acute single claw appearing as if united to the end of tibiæ; middle and hind legs slender, each with two tarsal claws; middle tarsi 1-jointed, hind tarsi 3-jointed, the third joint as long as the others united; meso and metasterna each with an erect tubercle which is compressed or laminate on three sides at base.

This genus differs from *Nerthra* by the characters given in key as well as a number of those set forth above, and from *Mononyx* by the elytra being wholly coriaceous without clavus or membrane, not overlapping as there, but meeting in a straight sutural line. With *Nerthra* Say, it forms the subfamily Nerthrinæ Kirkaldy (1906, 149) while *Mononyx* alone of our North American genera belongs to the subfamily Mononychinæ Fieber. The generic type and only species is:

1170 (—). GLOSSOASPIS BRUNNEA Blatchley, 1925, 51.

Subquadrate, broadly rounded behind. Color above a nearly uniform dark brown, when living coated with an earthy incrustation; sides of pronotum, apical portion of scutellum, tubercles of elytra, posterior half of each connexival, sterna and femora wholly or in great part dull yellow; abdomen, tibiæ and tarsi dull fuscous-brown, the posterior apical angle of each ventral paler. Beak concealed beneath the strongly deflexed head, its apex visible between the front coxæ. Pronotum two and a half times as wide as long, its transverse impression placed very close to base; side margins straight and subparallel, rounded into base, the apical angles obtuse, slightly prolonged; hind margin trisinuate; disk with sides broadly flattened, median portion with a transverse convexity formed of four broad obtuse tubercles separated by wide shallow grooves, the two median tubercles much the larger. Elytra at base slightly nar-

rower than pronotum, conjointly oval, reaching tip of abdomen; disk distinctly not strongly concave, not punctate and without setæ, each with a short oblong tubercle at middle of base, a larger obtuse one at middle and a third, much smaller, close to suture at apical fourth. Connexivum rather broadly exposed behind the sub-basal lobe of elytra, its margin coarsely crenate. Apex of front trochanters forming a short bifid tooth. Middle tarsi 1-jointed; hind tarsi 3-jointed, the third joint as long as the others united. Genital plate of male concealed beneath the sixth ventral. Other structural characters as above given. Length, 8.2 mm.; width, 5 mm.

Known only from two males taken March 21, 1911, from the muddy margins of Arch Creek, Fla. This is probably the *Mononyx stygicus* of Uhler (1884, 264) *new* Say, and the *Nerthra stygica* Say of Howard (1902, pl. XXIX, fig. 16) but, as pointed out by Bueno (1905e) it is not Say's species which is described below. However, Bueno is in error in supposing that the form described by Uhler and figured by Howard is "either *Mononyx fuscipes* Guer. or *M. nepaeformis* (Fabr.)," as those two species are both true members of *Mononyx*, having the elytral membrane present and overlapping.

III. NERTHRA Say, 1832, 37; I, 364.

Differs from *Glossoaspis* by the characters given in key and by having the front of head less vertical, more triangular and tuberculate near apex; ocelli very small, almost concealed by the surface crust; eyes shorter, more convex; pronotum narrower, twice as wide as long, its sides less broadly flattened and median convexity less rugose; elytra without a lateral expansion near base, the disk feebly convex instead of concave, without distinct tubercles, but much roughened with oblique lines of short acute elevations; front femora more swollen, the raised inner margin of their groove wider or more elevated, but confined to the apical half; front tibiæ and the single tarsal claw shorter, the former carinate on outer side; mesosternal tubercle shorter, compressed, more inclined, its apex with several bristles; hind tarsi 3-jointed, the joints subequal in length. Genital plate of male deflected toward the right. One species is known.

1171 (1411). NERTHRA STYGICA Say, 1832, 37; I, 364.

Oval, broadly rounded behind. Dull blackish-brown above, fuscous-brown beneath; flattened sides of pronotum sometimes yellowish; tibiæ and tarsi piceous. Apex of front of head with four small tubercles, the median pair the longer. Pronotum with sides straight, subparallel, feebly

curved at apical fourth, front angles obtuse, slightly prolonged; hind margin subtruncate, disk with median portion moderately convex, roughened or uneven, without distinct tubercles or grooves. Scutellum indistinct, apparently fused with the elytra. Elytra with base as wide as pronotum, apex conjointly broadly rounded, the median suture indicated only by a feeble groove. Connexivum narrowly exposed, its margin entire. Other characters as above given. Length, 7.4—7.8 mm.; width, 5.3—5.5 mm.

Dunedin, Fla., Feb. 21—March 20; one female and one nymph taken from the mucky margin of a pond, a third from the maws of a spider beneath a gunny sack in an orange groove. Recorded from Charlotte Harbor, Ft. Myers and Enterprise, Fla. Described from Georgia and known only from those two states.

Family XXXVI. NAUCORIDÆ Fallen, 1814, 3, 15.

THE CREEPING WATER-BUGS.

Oval, subdepressed aquatic Heteroptera of medium size, having the head large, wider than long, vertical in front, inserted in thorax to middle of the large lunate eyes; ocelli wanting; beak short, 3-jointed, acute, its base covered by the large flat labrum; antennæ short, 4-jointed, in repose concealed in clefts beneath the eyes; pronotum much wider than long; scutellum broadly triangular, obtuse at tip; elytra coriaceous, clavus and corium distinct, membrane feebly differentiated; legs short, subequal in length, front ones inserted on or near the front of prosternum, raptorial, with femora usually much swollen; middle and hind legs slender, fitted for crawling, their tarsi 2-jointed and ending in long claws.

The family is a small one comprising about nine genera and represented by nearly 60 described species, many of them synonyms. Of these but two genera and thirteen species are known from North America and but one genus and two species from our territory. Of their habits Uhler (1884, 259) says: "They are fond of reedy and grassy quiet waters where they move about like the Dytiscid beetles, creeping and half swimming around and between the leaves and sprays of the submerged plants and suddenly seizing any unlucky *Corisa* or other insect that happens to be within reach." The principal literature treating of our species is by Stal, 1876; Uhler, 1884; Montandon, 1898; Champion, 1901, and Bueno, 1903, 1907b.

I. PELOCORIS Stal, 1876, 42.

To this genus belong those members of the family having the eyes lunate, widely separated, their front portions converging and inner margins sinuate; labrum subtriangular, its apex obtuse; front margin of pronotum but feebly concave or sinuate; embolium flattened, covering the basal half of connexivum; under side of head and prosternum strongly carinate at middle; mesosternum elevated, obtusely tectiform; front tibiæ slender, curved, received in a groove on under side of femora; front tarsi 1-jointed, destitute of claws; hind tarsi shorter than tibiæ, the latter with two rows of sub-appressed spines. Two of the 14 nominal species occur in our territory.

KEY TO EASTERN SPECIES OF PELOCORIS.

- a. Front portion of pronotum, except at middle, with densely placed very fine and shallow ocellate punctures, its side margins but feebly flattened; median lobe of sixth ventral of female not cleft.

1172. FEMORATUS.

- aa. Front portion of pronotum, except at middle, densely, finely rugosely shagreened or scabrous and with numerous scattered coarse punctures, its side margins more broadly flattened; median lobe of sixth ventral of female deeply cleft.

1173. CAROLINENSIS.

1172 (1366). PELOCORIS FEMORATUS (Palisot de Beauvois), 1805, 237.

Broadly oval, subdepressed. Head, prosternum, front portion of pronotum, connexivum and sometimes the scutellum dull greenish-yellow, the head usually with a median brown stripe, this widened on apex and often extending back onto pronotum; hind lobe of pronotum dull white with scattered longitudinal darker marks; elytra, scutellum usually, and under surface olive-brown or gray, the clavus sometimes paler; legs and beak dull greenish-yellow, the tips of tibiæ and tarsi darker; connexivals each with an oblong brown spot next the incisure, their hind angles acute, slightly prolonged, more so in male. Head with a vague lengthwise median impression, the sides near eyes coarsely, sparsely punctate. Pronotum more than twice as wide as its median length, its transverse impressed

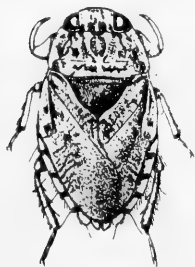


Fig. 206. X 3.
(After Champion).

line across basal fourth feeble; middle of front portion with a triangular area marked with short transverse impressed lines, these regularly decreasing in length from the front, hind portion shagreened in wavy transverse lines. Scutellum and elytra thickly very finely punctate, each puncture enclosing a minute prostrate yellowish hair. Keel of mesosternum, tarsi and genital segments each with numerous long inclined hairs. Male with fifth and sixth ventrals formed of three movable parts; genital oblong-oval, convex. Length, 9—11.5 mm. (Fig. 206).

Common in northern Indiana, less so in the southern counties. Occurs throughout the year, the adults hibernating in the mud and debris on the bottom and along the sides of the pools which they inhabit. Sanford, Arch Creek, R. P. Park, Moore Haven and Dunedin, Fla., December—April. Recorded also from several other stations and doubtless occurs throughout that State. Its recorded range extends from New England west to South Dakota and southwest to Florida, Louisiana, Central America and even Uruguay, but probably several species are included. A form known as *biimpressus* Montd., recorded by Stal from "N. Am.", differs from *femoratus* only in having a darker scutellum and a dark streak on embolium. The color of *femoratus* is variable, the pronotum being sometimes thickly sprinkled with fuscous spots and the under surface often in great part or wholly greenish-yellow. Of its habits Uhler (1884, 259) says:

"It has an exceedingly acute rostrum and uses it with great freedom upon small mollusks, larvæ of dragonflies and other aquatic animals. The adults hibernate in deep muck, especially where reeds or water-plants remain rooted throughout the winter. Upon the first approach of mild weather it leaves the winter retreat, moves actively about and soon prepares to lay the eggs which it glues to the submerged leaves and sprays of plants."

Bueno (1903, 172) states that: "The adults may, under favorable conditions, live for a year, and oviposition seems to be continuous during the summer, giving a number of overlapping broods from over-wintering adults." By personal experience I have learned that *P. femoratus*, when picked up or held incautiously can and often does inflict a severe wound with its beak, the pain for a few seconds being more intense than that produced by the sting of a hornet.

1173 (1368). *PELOCORIS CAROLINENSIS* Bueno, 1907b, 227.

Slightly smaller and more narrowed in front than *femoratus*. General color usually paler, the more flattened margins of pronotum and embolium usually pale greenish-yellow; abdomen varying from dull yellow to dark brown. Pronotum much as in *femoratus*, the sculpture on sides of disk different as shown in key. Connexivum more widely exposed, the hind angles of its segments more prolonged. Length, 8.2—9.6 mm.

Dunedin and Ft. Myers, Fla., November—March (*W. S. B.*). Lake Ellis and Southern Pines, N. Car., June (*Brimley*). Taken at Dunedin in company with *femoratus* and at Ft. Myers by sifting

debris on the bed of an extinct pond. The females are easily separated from those of *femoratus* by the deeply cleft sixth ventral, while the males are difficult to distinguish. Recorded also from St. Augustine, Titusville and Lake City, Fla., and known only from that State, North and South Carolina and Kansas. At Lake Ellis, N. Car., the type locality, it "fairly swarmed in the lake among the water-weeds."

Family XXXVII. NEPIDÆ Latreille, 802, 252.

THE WATER SCORPIONS.

Aquatic insects of very diverse form but agreeing in having the head porrect; ocelli absent; beak subulate, 3-jointed, very short; antennæ 3-jointed, in repose concealed in a pocket beneath each eye; elytra entire, usually covering the abdomen, the clavus, corium and membrane distinct, the membrane with reticulate veins; front legs raptorial, inserted very near the front margin of prosternum, their coxæ elongate, femora grooved beneath for the reception of the tibiæ and tarsi, the latter 1-jointed; middle and hind legs more slender, not flattened, fitted for crawling, their tarsi also 1-jointed and ending in a pair of long slender divergent claws; abdomen furnished behind with two long, slender bristles, these grooved on the inner side, and when fitted together forming a respiratory tube.

The members of this family inhabit, for the most part, shallow stagnant water and delight in the mud and decaying vegetable matter which accumulates on its bottom. When they wish to take in a supply of air they rest on their long legs or cling to a submerged plant and project the end of the abdominal tube above the surface of the water film. They have the power of stridulation or making a noise either to attract their mates or to express some emotion. Bueno (1903a, 235; 1905c, 85) has described the stridulation of *Ranatra fusca*, which at times produces a "rasping creaky chirp."

"This is produced by a 'tonal apparatus' situated in the deep and elongated coxal cavities of the first pair of legs and consists essentially of two opposing rasps, one on the coxa near the base and the other on the inner surface of the front margin of the lateral plate of the coxal cavity. The sound is made both in and out of water by the insect jerking its front legs back and forth. Both legs may be in motion at once, independently of each other, or one only may be waved about. Each leg therefore stridulates without reference to the other, as *Ranatra* jerkily moves it about in anger or excitement."

The principal literature treating of our species is by Uhler, 1862, 1884; Bueno, 1903a, 1905c, 1905d, 1923; Montandon, 1910, 1910a, and Hungerford, 1920, 1923b. The family is a small one and is represented in America by eight genera and about 30 species. Of these two genera and seven species occur in the eastern states.

KEY TO EASTERN GENERA OF NEPIDÆ.

- a.* Form elongate-oval or elliptical, strongly flattened; front tibiæ and tarsi united nearly as long as femora (Subfamily Nepinæ).
I. NEPA, p. 1033.
- aa.* Form elongate, subcylindrical; front tibiæ and tarsi together less than half the length of femora (Subfamily Ranatrinæ).
II. RANATRA, p. 1034.

I. NEPA Linnæus, 1758, 440.

Elongate-oval flattened species having the head longer than wide, inserted up to the eyes in a deep median concavity of the front of thorax; pronotum flat, much wider than head, subquadrate, side margins straight, front one deeply concave, hind one more broadly and shallowly so; scutellum triangular, its sides nearly equal; front legs not much shorter than the others, their coxæ very stout, curved, as long as head, femora much swollen, grooved their full length beneath to receive the curved tibiæ and rigid 1-jointed tarsi, which fit into it like the blade of a pocket-knife; middle and hind femora also grooved. But one American species is known.

1174 (1379). NEPA APICULATA Uhler, 1862, 12.

Color a nearly uniform fuscous-gray; base of abdomen above tinged with reddish; tarsal claws yellow. Head and pronotum granulate, the latter with the transverse impression across basal third, its front portion with three broad grooves separated by obtuse ridges, hind one with a similar groove each side. Scutellum and claval commissure subequal in length; abdominal tubes less than one-third the length of elytra. Length, 18—20 mm. (Fig. 207, *a*).

Lake, Kosciusko and Wayne counties, Ind., May—July; probably occurs throughout the State, but apparently scarce as but one specimen has been taken at a time. The known range extends from Quebec and New England west to Minnesota and Illinois and south to Georgia. Of its habits Severin (1911a, 99, 103) has written:

"It is found in quite shallow water, not much over two or three inches deep, concealed in the mud, or in a situation where grasses grow

out of the water, clinging together. When raked out of the water together with the mud and partially decayed vegetation, these insects usually feign death, in which condition they readily escape detection, as their flat bodies are effectively concealed by the black mud and decaying plant tissue. When kept in an aquarium *Nepa* will reach for its prey with its raptorial legs, but in no instance could it be induced to swim or run after its prey. If a house-fly or dragon-fly nymph is carefully and slowly brought toward the front legs, the claw-like tibiæ and tarsi slowly move away from the femora. If they are already extended and well separated, as is often the case, the insect usually remains perfectly quiet until the prey is actually placed between the outstretched legs, when suddenly it is seized and securely held. The piercing organs are then inserted into a soft part of the body and the insect begins to feed.

"*Nepa* will not only use smaller animals than itself as food, but it will also feed upon dragon-fly nymphs considerably larger and stronger than itself, the struggles of the nymphs usually ceasing within a short time after the piercing organs of a *Nepa* have been pushed into their bodies. That this is the effect of a fluid which *Nepa* injects into them was only too well demonstrated on ourselves. While one of us was carelessly holding several *Nepas* in a closed hand, one of the insects suddenly punctured the palm, causing an intense pain and soon afterwards a considerable swelling. If *Nepas* are allowed to remain in a jar of water, containing no vegetation or anything upon which they can crawl to the surface, they will all sooner or later be drowned. We have kept them alive three months in a flat dish with water in it, shallow enough for the insects to reach the surface with their breathing tube, by feeding them now and then with house-flies and dragon-fly nymphs."

The eggs of *Nepa* are globular and bear at one end eleven tubular filaments. They are inserted in the stems of water plants so that the body of the egg is concealed while the threads project above the surface of the plant in which the eggs are inserted.

II. RANATRA Fabricius. 1790. 227.

Elongate, subcylindrical species having the head wider across the eyes than long; eyes very prominent, strongly protruding; pronotum four or more times longer than its greatest width, subcylindrical, obtusely carinate above, its front margin slightly widened and feebly concave, hind one deeply concave; scutellum narrowly triangular, convex, only about one-fourth the length of claval commissure; elytra closely embracing the sides of abdomen, clavus and membrane both very long and narrow; front legs slender, much shorter than and widely separated from the others, their coxæ nearly as long as pronotum, femora thickened at base, curved somewhat upward and narrower to-

ward apex, armed beneath in front of middle with one or two blunt teeth, the apical third grooved and finely fimbriate for the reception of the much shorter curved tibiæ and rigid single-jointed tarsi; middle and hind legs very slender, the hind tarsi longer than femora; abdomen carinate beneath along the middle; abdominal tube two-thirds or more the length of elytra, protected at base by a shield formed by a prolongation of the sides of last dorsal.

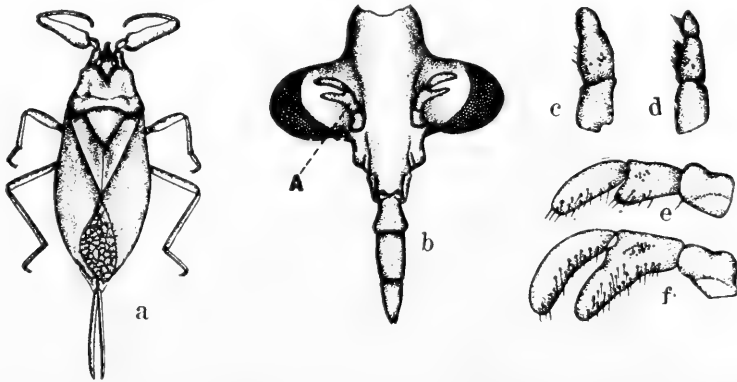


Fig. 207. *a*, *Nepa apiculata* Uhl., X 1.7; *b*, ventral view of head of *Ranatra* showing antennæ (A) in repose; *c* and *d*, antennæ of *Ranatra kirkaldyi* Bueno, the terminal segments fused in *c*, separate in *d*; *e*, antenna of *R. nigra* H.S.; *f*, same of *R. fusca* P. B. (After Hungerford).

The genus is represented throughout the world, about 20 species being known from America, eight of which occur in this country, six in our territory. The synonymy of our species is very much confused and will never be correctly determined with certainty until the types of the *R. fusca* of Palisot-Beauvois and the *R. nigra* of Herrich-Schaeffer are studied in connection with those of Montandon and others. I have adopted the conclusions of Hungerford (1923b) in the nomenclature which follows.

KEY TO EASTERN SPECIES OF RANATRA.

- a*. Front femora broad, stout, not constricted near middle and usually without a preapical tooth or sinuation (fig. 208, *b*); second joint of antennæ simple, without a branch or prolongation on side (fig. 207, *c* and *d*); length of body, 23—30 mm. 1175. KIRKALDYI.
- aa*. Front femora more slender, distinctly narrowed in front of the submedian tooth; second joint of antennæ with a branch or prolongation on side (fig. 207, *e* and *f*).

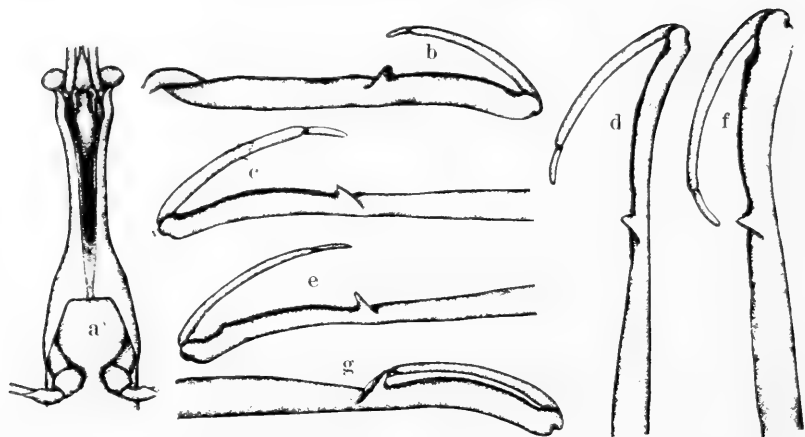


Fig. 208. *a*, Ventral view of head and prothorax of *Ranatra buenoi* Hung., showing deep rostral groove of prosternum; *b*—*g*, front femora of *Ranatra*, showing the form, median tooth and, when present, the subapical one; *b*, of *R. kirkaldyi* Bueno; *c*, *R. nigra* H. S.; *d*, *R. buenoi* Hung.; *e*, *R. drakei* Hung.; *f*, *R. fusca* P. B.; *g*, *R. australis* Hung. (After Hungerford).

- b*. Front femora very slender, without a preapical tooth (fig. 208, *c* and *d*); branch of second antennal not more than one-half the length of third or last antennal (fig. 207, *e*).
 - c*. Groove of prosternum shallow, more or less convex at middle and with a depressed line each side; color usually pale dull yellow; breathing tube shorter than abdomen; length of body, 30—32 mm. 1176. NIGRA.
 - cc*. Groove of prosternum single, as deep or deeper than wide (fig. 208, *a*); color fuscous-brown; breathing tube longer than abdomen; length of body, 32—38 mm. 1177. BUENOI.
 - bb*. Front femora (except in *drakei*) much stouter and (except in *australis*) with a preapical sinuation and tooth; branch of second antennal more than one-half the length of third antennal (fig. 207, *f*).
 - d*. Front femora with a preapical sinuation and tooth (fig. 208, *e* and *f*); upper margin of cheeks not elevated above the tylus; legs not or very faintly annulated.
 - e*. Front portion of pronotum, along the median dorsal line, more than twice as long as thickened basal portion; eyes very large, their diameter greater than width of interocular area; breathing tube usually more than 30 mm. in length. 1178. DRAKEI.
 - ee*. Front portion of pronotum distinctly less than twice the length of thickened basal portion; eyes smaller, not wider than interocular area; hind femora not reaching middle of fifth ventral; breathing tube less than 25 mm. in length. 1179. FUSCA.
 - dd*. Front femora without a preapical sinuation or tooth (fig. 208, *g*); cheeks prominent, their upper margin rising above the level of the tylus; front femora and tibiae annulated. 1180. AUSTRALIS.
- 1175 (—). *RANATRA KIRKALDYI* Bueno, 1905d, 187.

Dark brownish-yellow to fuscous-brown; legs sometimes paler than the body, often distinctly annulated. Eyes smaller and less protruding

than in allied species. Antennæ straight without lateral projections, the third joint often fused with second. Median third of pronotum distinctly narrower than apical and basal portions. Front femora not narrowed near the submedian tooth, shorter and stouter than in any of our other species (fig. 208, *b*). Prosteronum with middle somewhat convex and with an impressed line each side. Abdominal filaments shorter than abdomen, the hind tarsi reaching beyond their middle. Length of body, 23—30 mm.; of breathing tube, 16—20 mm.

Lake, Starke and DeKalb counties, Ind., May—August. R. P. Park, Fla., March 28 (*W. S. B.*). Wolf Lake, Ind., Nov. 17 (*Gerhard*). Milburnie, Kipling and Raleigh, N. Car., November—March (*Brimley*). Ranges from Massachusetts west to South Dakota and Kansas and south to Florida. Minnesota specimens, according to Hungerford, are shorter and more robust than typical *kirkaldyi* and the front femora have a well marked sinuosity near the inner apex. To them he has given the varietal name *hoffmanni*. *R. kirkaldyi* is our smallest eastern species. The front femora are but little longer than the coxæ and usually with distinct pale and dark rings, and the pronotum is relatively more narrowed at middle than in its allies. It was made a synonym of *R. fusca* by Montandon and Van Duzee, but is rightfully considered distinct by Hungerford (1923b, 440).

1176 (1385). *RANATRA NIGRA* Herrich-Schaeffer, 1853, 32.

Pale to dull brownish- or grayish-yellow; front legs not annulate, the knees and tips of tarsi darker; middle and hind legs feebly annulated. Eyes prominent, but less so than in *buenoi*. Pronotum relatively short, its front lobe about two and a fourth times the length of hind one, but little enlarged in front. Front femora long and slender, more than one-half longer than coxæ, distinctly narrowed in front of the submedian tooth (fig. 208, *c*); hind femora reaching tip of elytra. Abdominal filaments shorter than abdomen, the hind tibiae reaching their tip. Length of body, 30—32 mm.; of breathing tube, 18—21 mm.

Starke, DeKalb, Kosciusko and Marion counties, Ind., July—October; probably occurs throughout the State. Dunedin and R. P. Park, Fla., Nov. 20—Dec. 12. Four specimens were taken at Dunedin from a mass of water weeds in a ditch opening into a large pond and one at R. P. Park from a bunch of *Potamogeton* in a canal dug in the surface limestone. These Florida examples are a uniform slate-gray and have the respiratory tube 23—25 mm. long. Otherwise they agree in all particulars with those from Indiana. The only other known Florida specimen is in the U. S. National Museum without definite station record.

Carey, Ill., August (*Gerhard*). Ranges from Ontario and New England west to Minnesota and Kansas and south to Arkansas and Florida. This, according to Hungerford, is the *R. protensa* Montd. (1910, 185) and of subsequent authors. It is more slender with shorter breathing tube than *fusca* = (*americana*) and lacks the preapical femoral tooth of that species. From *kirkaldyi* it differs in the longer, much more slender front femora and less widened apical third of pronotum. It was probably of this species that Uhler (1884, 254) under the name of *R. fusca*, wrote:

"It delights to live among the muck and rubbish of shallow fresh water, and may sometimes be seen lodged on the stems and leaves of the pond-weed in basins of cold spring water. During the warm summer weather it may be seen at times resting for an hour or more on the bottom, stilted on its long legs, with its respiratory tube projected upward, just a little above the surface of the water. At other times it searches for the eggs of pond-fish, which it destroys by drawing out their contents, and it occasionally attacks the young fish of other kinds, grasping them with its fore claws and sucking their blood."

1177 (—). *RANATRA BUENOI* Hungerford, 1923b, 44.

Dull gray to dark fuscous, front femora unicolorous; middle and hind legs of the paler individuals indistinctly annulated. Eyes very prominent, their diameter greater than width of interocular area. Front portion of pronotum but very slightly wider at apex than at middle, about twice as long as hind lobe (7.5 to 4 mm.). Prosternum with a single deep and broad median groove (fig. 208, *a*). Front femora as in *nigra*, the submedian tooth larger, placed at apical two-fifths (fig. 208, *d*). Hind femora scarcely reaching end of abdomen; hind tibiæ slightly surpassing end of breathing tube. Length of body, 32—38 mm.; of breathing tube, 22—27 mm.

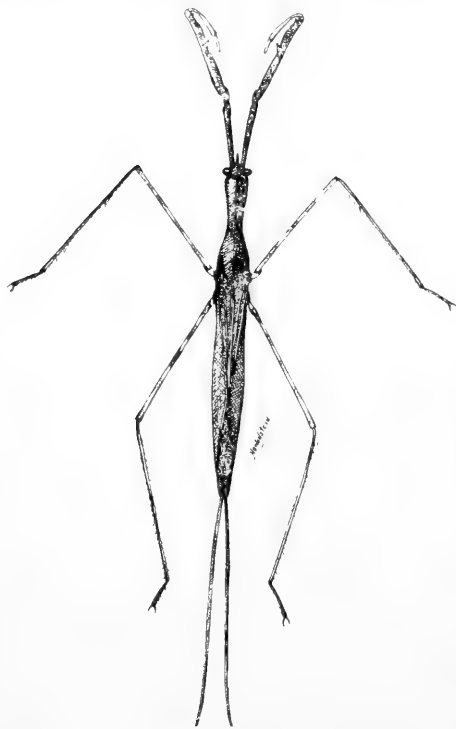
Raleigh and McCutters, N. Car., June—September (*Brimley*). Its known range is southern, extending from Missouri to Florida, Louisiana and Texas. Hungerford records the taking of 17 males and 22 females at Gainesville, Fla., by Drake on June 19. This is the *R. fusca* of Bueno (1905d, 188) *nec* Beauvois. The single broad and deep sulcus of prosternum and much longer breathing tube readily distinguish it from *nigra*, its nearest ally.

1178 (—). *RANATRA DRAKEI* Hungerford, 1923b, 451.

Elongate-subcylindrical, long and slender for the genus. Dull brownish-yellow, in life overcast with an orange tinge; legs not annulated. Eyes very large and prominent, their diameter greater than the interocular width. Pronotum long and slender, its front portion with apex but

little wider than middle, more than twice the length (along the dorsal median line) of hind one. Prosternum with a narrow and shallow median groove, with an impressed line each side. Front femora long and slender, with a distinct preapical sinuation, the tooth behind this slender, subacute (fig. 208, *e*); hind femora reaching or passing middle of last ventral segment; hind tibiæ reaching or slightly passing middle of breathing tube. Abdomen two and one-fourth times the length of pronotum. Breathing tube very long, in many specimens as long as body. Length of body, 35—46 mm.; of breathing tube, 28—44 mm.

Raleigh, N. Car., June (*Brimley*). Described from Gainesville, Fla., and hitherto recorded only from there. The pale color, large prominent eyes, long slender body and pronotum and very long caudal filaments, are the principal distinctive characters of this species.



1179 (1383). *RANATRA FUSCA* Palisot de Beauvois, 1805, 235.

Dark reddish- to fuscous-brown; legs not or very faintly annulated; front femora usually paler than the coxæ. Eyes prominent, as wide as interocular area. Pronotum as in key, its front portion but little wider at apex than middle, about one-half longer than the thicker basal one, (6 mm. to 4.2 mm.), the hind margin of latter rather deeply and narrowly emarginate. Prosternum with a wide and shallow median groove. Front femora relatively stout, one-half longer than the coxæ, and with a distinct preapical sinuation preceded by a blunt

Fig. 209, X 2. (After Lugger).

tooth (fig. 208, *f*). Middle and hind femora relatively short, the latter scarcely surpassing middle of membrane; hind tibiæ reaching about to apical fourth of breathing tube, the latter shorter than abdomen. Length of body, 35—42 mm.; of breathing tube, 21—24 mm. (Fig. 209).

Lake, Marion, Putnam and Vigo counties, Ind., May 9—Oct. 1. Forest Hills, Mass.; Ft. Lee, N. J., and Raleigh, N. Car., (*Brimley*). Ranges from Quebec and New England west to

South Dakota and Colorado, and southwest to Florida, Kansas and Texas. Recorded by Barber from St. Augustine and Titusville, Fla. This is our most robust eastern species, but it is equalled or exceeded in length by some examples of *australis* and *drakei*. It is the *R. americana* Montandon (1910a, 65) and is probably more common and more widely distributed than any of our others. The robust form, with preapical sinuation and tooth of front femora distinguish it from all others except *drakei*, from which it is separated by the characters given in key. An occasional specimen is found in which the preapical tooth of front femora is absent. These represent the var. *edentula* Montandon. *R. fusca* has also been recorded many times under the name *R. quadridentata* Stal, a name belonging to a southwestern species.

1180 (—). *RANATRA AUSTRALIS* Hungerford, 1923b, 449.

Elongate, subcylindrical, rather slender. Dark fuscous- or grayish-brown; front femora and tibiæ with paler annulations. Eyes rather small, their diameter less than width of interocular area. Cheeks wider and more prominent than in any other species. Front part of pronotum subcylindrical, about twice as long as thickened basal portion, the hind margin of latter broadly and shallowly emarginate. Scutellum with two pit-like foveæ. Groove of prosternum as in *fusca*. Front femora rather stout and broad, without preapical sinuation, more than one-half longer than coxæ (fig. 208, *g*). Hind femora passing middle of last ventral. Genital plate of female strongly carinate at middle. Breathing tube distinctly longer than abdomen. Length of body, 32—37 mm.; of breathing tube, 27—30 mm.

Ormond, Lake Wales, Moore Haven, R. P. Park and Dunedin, Fla., December—April (*W. S. B.*). Mobile, Ala., (*Gerhard*). Its known distribution is southern, extending from North Carolina and Florida west to Kansas, Louisiana and Texas. This I have found to be the most common *Ranatra* in Florida, where it occurs among the *Chara* and other water weeds of shallow ditches, and along the margins of ponds and lakes. A number of Hungerford's cotypes were from Gainesville and Lake Kissimmee. The Kissimmee specimen in the U. S. National Museum is labeled: "Alligator flea or water-dog, said to bite or sting severely." This species is allied to *fusca* but is more slender, with longer pronotum and breathing tube, more prominent cheeks, front femora devoid of preapical tooth and both they and tibiæ distinctly annulate, a color character not mentioned by Hungerford.

Family XXXVIII. BELOSTOMATIDÆ Leach, 1815, 123.

THE GIANT WATER-BUGS.

Large or very large, dull brown, oval or oblong-oval, subdepressed aquatic Heteroptera having the head subconical, longer than the width across the eyes, declivent in front; eyes large, projecting backward over front angles of pronotum; ocelli absent; beak stout, 3-jointed, reaching or slightly surpassing front coxæ; antennæ very short, 4-jointed, the two middle joints more or less pectinate, in repose concealed beneath the eyes; pronotum trapezoidal with a transverse impressed line behind its middle, hind margin subtruncate, front one feebly sinuate; scutellum large, flat, triangular, its apex acute; elytra entire, covering the abdomen, the usual divisions distinct; legs short, front ones prehensile, their coxæ short, femora stout, usually grooved for the reception of the tibiæ, front tarsi 2-jointed, ending in a single long sharp claw; middle and hind legs fitted for swimming, their tibiæ and tarsi flattened, the edges in *Benacus* and *Lethocerus* with a dense fringe of hairs, in *Belostoma* armed also with setæ, the tarsi with two claws; abdomen with sides furnished with a broad stripe of appressed silky yellowish hairs and apex with a pair of short retractile strap-like appendages which, in repose, are usually concealed; ventrals each appearing as if composed of three pieces, viz., a flat subquadrate one each side and a much wider median one which is strongly keeled.

In bulk of body this family comprises the largest of our Heteroptera some of the tropical South American species reaching a length of more than four inches. All are predatory, feeding on aquatic insects, young fish, tadpoles and other water-dwelling creatures. In the nymphal stages the front tarsi are furnished with two long claws, in the adult with but one. During the mating season they fly from one pool or body of water to another. When electric street lights were first installed our larger species were attracted to them by hundreds and for the first time the average human learned that such bugs were denizens of the earth. To them he gave the name of "electric light bugs," and their uncouth shape and sprawling motions, when on the ground beneath the lights, usually caused him to regard them with a "holy terror." They are, however, harmless, but when picked up incautiously can inflict a severe wound with their stout beak. This is very painful for a time, but seldom produces a swelling or numbness.

About 12 genera and 60 species of Belostomatidæ are known, mostly from the tropical regions. Of these four genera and 20 species are recorded from North America, three genera and seven species being definitely known from the eastern states. The principal literature treating of our forms is by Say, 1832; Leidy, 1847; Mayr, 1852, 1871; Uhler, 1884; Montandon, 1896; Champion, 1901; Bueno, 1906a, 1923; Needham, 1907, and Hungerford, 1920.

KEY TO EASTERN GENERA OF BELOSTOMATIDÆ.

a. Fore femora not grooved in front; length, 50 or more mm.

I. BENACUS, p. 1042.

aa. Fore femora grooved in front.

b. Elongate-oval; cheeks meeting in front of tylus; beak elongate-conical or subulate, its first joint shorter than second; larger, length, 40 or more mm.

II. LETHOCERUS, p. 1043.

bb. Broadly oval; cheeks not meeting in front of tylus; beak subcylindrical, acute, its first joint longer than second; smaller, length, less than 30 mm.

III. BELOSTOMA, p. 1045.

I. BENACUS Stal, 1862a, 205.

This genus contains but a single species, our largest representative of the family. It has the front legs more slender than in the species of *Lethocerus* and their femora, instead of being grooved in front are rounded off and widely clothed with a very short velvety pile.

1181 (1387). BENACUS GRISEUS (Say), 1832, 37; I, 365.

Elongate-oval. Above dark olive- or grayish-brown; head except eyes, a vague median stripe and some irregular blotches on pronotum, and the narrow side margins of pronotum and elytra, dull yellow; sterna also dull yellow with three narrow blackish stripes; remainder of under surface and legs, fuscous-brown, the femora and keel of abdomen often wholly or in part paler. Tylus short, oval, enclosed by the short broadly triangular cheeks. Pronotum with a narrow median impressed line, its side margins straight, converging from base to apex. Length, 55—65 mm.; width, 18—22 mm.

Lake, Kosciusko, Blackford and Marion counties, Ind., May—October; doubtless occurs throughout the State. Bradentown and Istokpoga, Fla., January—March. Recorded also from Clearwater, Ft. Myers and St. Augustine, Fla. Occurs in sluggish waters of ponds and streams and in early summer, during the mating season, often at electric lights. At that season numerous specimens may often be found in the washup of Lake Michigan and the larger lakes of Indiana. Its known range extends from Quebec and New England west to Min-

nesota and Iowa, and south to Florida, Texas and the West Indies. The eggs are large and spherical and are attached to the stems of rushes and other water plants. Uhler (1884, 256) calls it:

"The facile master of the ponds and rivers of the Atlantic States. Developing in the quiet pools, secreting itself beneath stones or rubbish, it watches the approach of a mud-minnow, frog or other small-sized tenant of the water, when it darts with sudden rapidity upon its unprepared victim, grasps the creature with its strong clasping fore legs, plunges its deadly beak deep into the flesh and proceeds with the utmost coolness to leisurely suck its blood. A copious supply of saliva is poured into the wound and no doubt aids in producing the paralysis which, in small creatures, so speedily follows its puncture."

II. LETHOCERUS Mayr, 1852, 15.

The larger species of this genus resemble very closely those of *Benacus*, but are readily distinguished by the shorter legs with much broader fore femora which are deeply grooved in front for the reception of the tibiae and tarsi; middle and hind femora also grooved. About ten species are known, five from North America, three of these occurring in our territory. They were formerly classed under the generic name *Belostoma*, now applied to the smaller species formerly known as *Zaitha*. Bueno (1923, 397) says that the eggs of *Lethocerus* are laid in masses under stones, planks or logs in wet places near their haunts.

KEY TO EASTERN SPECIES OF LETHOCERUS.

- a. Sides of elytra obviously, but feebly, curved; middle and hind legs vaguely if at all annulate.
- b. Width of interocular area subequal to that of one eye; legs comparatively long and stout; length, 50 or more mm.
 - 1182. AMERICANUS.
- bb. Width of interocular area greater than that of one eye; legs shorter and more slender; length, 40 to 45 mm.
 - 1183. OBSCURUS.
- aa. Sides of elytra straight and subparallel from base to apical third; middle and hind legs distinctly annulate; length, 40—48 mm.
 - 1184. UHLERI.

1182 (1388). LETHOCERUS AMERICANUS (Leidy), 1847, 58, 66.

Elongate-oval. Color above a nearly uniform dull brownish-yellow, more or less mottled or streaked with wavy fuscous lines; scutellum sometimes with three vague paler spots; under surface in great part dull yellow dotted with fuscous, the sides and hind margins of sterna often darker; femora dull yellow vaguely mottled with black; tibiae and tarsi fuscous-brown. Vertex narrower and less convex than in *B. griseus*. Front femora very broad, the groove bordered each side by dense dark brown velvety pile. Length, 50—55 mm.; width, 19—21 mm. (Fig. 210).

Vigo and Marion counties, Ind., October; Orizaba, Mexico, July (*H. S. B.*). Chicago, Ill., June (*Gerhard*). Ranges from Quebec and New England west to British Columbia and Colorado and southwest to Florida, Texas and Mexico. The only definite

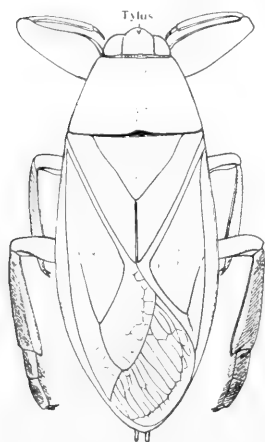


Fig. 210. Natural size.
(After Garman, Hemiptera of Connecticut).

Florida record is that of Barber (1914) from Jacksonville. Like *B. griseus*, which it resembles very closely in size and color, it is attracted to electric lights, my Orizaba specimens having been taken in the gutter beneath an arc light. Its habits, as far as known, are the same as those of *B. griseus*.

1183 (1389). *LETHOCERUS OBSCURUS* (Du-four), 1863, 383.

Elongate-oval; sides of vertex subparallel. Above dull brownish-yellow, more or less mottled with wavy fuscous lines; under surface fuscous-brown, the pro- and mesosterna paler; legs dull yellow with fuscous markings more evident than in *americanus*. Vertex wider and more convex than there. Front femora narrower, its groove more shallow. Length, 40—45 mm.; width, 17—18 mm.

Staten Island, N. Y., and Washington, D. C., June (*Davis*). Chicago, Ill., May (*Gerhard*). Ranges from Massachusetts west to Illinois. Recorded also from Utah. Smaller, more slender and parallel, and usually of a darker hue than *americanus*.

1184 (1391). *LETHOCERUS UHLERI* (Montandon), 1896, 513.

General color dull brownish-yellow; vertex, except extreme base, a broad stripe each side of front lobe of pronotum, greater part of hind lobe, scutellum except sides, base of clavus and inner half of corium, dark fuscous-brown; middle and hind legs distinctly annulated with pale and dark rings; front femora dull yellow, vaguely striped or tinged with fuscous; front tibiae and tarsi fuscous-brown. Interocular area about as wide as eye, obtusely carinate, its sides parallel. Pronotum trapezoidal, its side margins straight and converging from base to apex; disk of front lobe with a median impressed line; of hind one and scutellum with a vague, narrow median carina. Connexivum narrowly exposed. Front femora moderately broad, deeply and narrowly sulcate. Length, 40—48 mm.; width, 16—18 mm.

Marshall Co., Ind., June 11. Ft. Myers and Dunedin, Fla., March—April; at electric light (*H. S. B.*). Mobile, Ala., August (*Gerhard*). Macon, Ga. (*Davis*). Recorded from five other Florida stations and apparently the most common species in

that State. Its recorded range extends from Pennsylvania and New Jersey west to Wisconsin and Kansas, and southwest to Florida and Louisiana. Smaller with sides more parallel than our other two species, the pale and dark markings more contrasting above and middle and hind legs distinctly annulated.

III. BELOSTOMA Latreille, 1807, 144.

Medium sized broadly oval, flat species having the interocular area much wider than the diameter of one eye; tylus produced beyond the apex of cheeks; beak passing front coxæ; pronotum subtrapezoidal, its front and side margins more or less sinuate or concave, the latter less convergent than in the two preceding genera, front lobe with a small oval concavity each side; elytra covering the abdomen, each with a small spot of golden pubescence near the inner apical angle of the corium; membrane with diagonal, usually simple, veins; connexivum narrowly exposed; front legs short and stout, their femora grooved; middle and hind ones longer, more slender, with both femora and tibiæ grooved and setose or spinose along the margins of the grooves, the tibiæ also fimbriate as in *Benacus*; apex of middle lobe of sixth ventral in males rounded or subacuminate.

Bueno (1906a) has given an account of the habits of *B. fluminca* Say, which may be taken as typical for the genus. In it he says:

"This species is, in common with all water-bugs, a predaceous carnivore, feeding on the juices of insects and snails, and very probably of such small or weak vertebrates as it can overpower. In times of stress it will feed on its own nymphs, which in turn are not averse to preying on each other when hungry, which is always. The bug apparently injects some paralyzing poison into its victims. Ordinarily, the prey is seized by the raptorial anterior feet and at times all three pairs are employed to hold fast some powerful insect or large victim, such as a snail. This water-bug's favorite haunts are muddy-bottomed ponds where it lurks among the weeds at the bottom. Sometimes it is found in little bayed-in places in streams, where there is a backwater, with grasses growing into it from the banks, or from the bottom.

"The eggs of *Belostoma* are borne during incubation on the back of the male. It was an American woman, Miss F. W. Slater, who finally established¹⁰² the fact that the female seized the male forcibly and converted him into an animated portable incubator. The female places herself on top of the male, her thorax extending outward and her legs hooked under him. Now, starting somewhere near the middle and sidling along every little while, she works her way around him as she fastens

¹⁰²Amer. Naturalist, 1899, pp. 931—933.

her eggs on his back by means of the water-proof glue secreted for that purpose. The male all the while hangs from the surface, back up, with his legs curled up under him, bravely bearing up under his burden. The egg-bearing male, however, like others of the same sex, dislikes exceedingly this forced servitude and does all he can to rid himself of his burden. From time to time he passes his third pair of legs over the dorsum, apparently in an endeavor to accomplish his purpose. In general, however, he keeps to his position at the surface, and every now and then moves up and down quite rapidly with a peculiar springy motion. If he is not able to get rid of it, as sometimes happens, he carries his burden till in due time, some ten days or so, all the little ones are emerged, when he at last frees himself from it. This egg bearing of the male, I imagine, is for the purpose of protecting the ova from the voracious appetites of the adults. I have observed males that succeeded in casting off the unhatched ova, seize them and greedily suck them. The females, also, are not free from this vice.

"In emerging, the young nymph escapes through a lid at the top of the egg, and when all, or at least the greater part, of the ova are empty, the male casts off the entire mass of shells and goes about his business. The same female may again burden him, and so far as aquarium observations go, she deposits several batches of eggs, averaging from 25 to 125 each, so she may become the mother of a progeny running into the hundreds."

Of the eight species of *Belostoma* recorded by Van Duzee from North America, three¹⁰³ occur in our territory.

KEY TO EASTERN SPECIES OF BELOSTOMA.

- a. Length, 20 or more mm.
 - b. Head but slightly longer than front lobe of pronotum, the tylus less convex, not prominent; claval commissure distinctly shorter than scutellum; form more narrow, less tapering behind middle of elytra. 1185. FLUMINEA.
 - bb. Head as long as middle of pronotum; tylus more convex, very prominent; claval commissure equal to or longer than scutellum; form more broadly oval, strongly tapering behind middle of elytra. 1186. LUTARIUM.
- aa. Length less than 20 mm.; head and tylus as in *fluminea*, its apex more blunt. 1187. TESTACEUM.

1185 (1393). *BELOSTOMA FLUMINEA* Say, 1832, 38; I, 364.

General color varying from a nearly uniform brownish-yellow to fuscous-brown; legs usually with large dark spots, the front femora often black beneath. Disk of pronotum finely transversely rugulose and granulate, the sides nearly straight. Scutellum with fine lengthwise rugæ at middle of basal portion and transverse ones near apex. Elytra with

¹⁰³The *B. boscii* Lep. & Serv. (usually listed as *Zaitha anura* H.-S., a synonym) is recorded by Van Duzee (1917, 468) from "Carolina," Florida, Arizona and California. No definite eastern record can be found. The nearest approach to one is that of Uhler (1894a, 223), where he says: "The habits of this species in Grenada seem to be the same as in Florida and the southwestern states." It is, therefore, not included in this work.

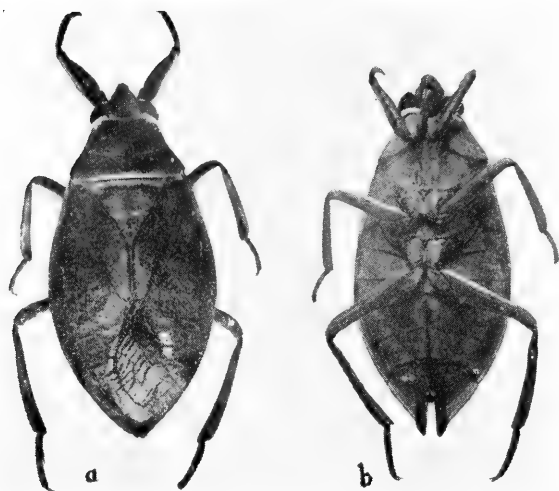


Fig. 211. *Belostoma flumineum* Say, dorsal and ventral views, X 2.
(After Drake, Tech. Bull. 16, N. Y. St. Coll. For.).

sides distinctly less convergent behind middle than in *lutarium*, the disk finely and thickly punctate. Silken stripe on sides of abdomen wider than in *lutarium*, covering wholly the side pieces and impinging upon the median plates of the ventrals. Length, 21—24 mm.; width, 9.6—10.4 mm. (Fig. 211).

Common throughout northern Indiana; less so in the southern counties, May 11—Oct. 21. Males at hand with eggs attached bear the dates July 18, Aug. 11 and Oct. 21. It is often taken beneath stones and rubbish near the margin of water. Recorded by Barber from St. Augustine, Biscayne Bay and Everglade, Fla., and therefore probably occurs throughout that State. Its known range extends from Quebec and New England west to Manitoba and Colorado and southwest to Florida, Louisiana and Arizona.

1186 (1394). *BELOSTOMA LUTARIUM* (Stal), 1855, 190.

General color dull brownish-yellow, usually more or less strongly tinged with fuscous; pronotum sometimes wholly fuscous; clavus and corium each often with a vague oblique fuscous stripe; middle and hind legs annulate with fuscous, front femora with spots of the same hue. Head longer and tylus more convex than in our other species. Pronotum as in *flumineum*, the sides more evidently sinuate. Scutellum broader at base than there. Elytra more sparsely punctate, distinctly more strongly tapering behind the middle, their tips more narrowly rounded or subacute. Silken stripe on sides of abdomen narrow, confined to the middle of the side pieces of the ventrals. Length, 22—26 mm.; width, 11.2—12 mm.

Vigo and Posey counties, Ind., October. Ormond, Sanford, Istokpoga, Arch Creek, R. P. Park, Dunedin and Ft. Myers, Fla., December—April (*W. S. B.*). Raleigh, N. Car., March—August (*Brimley*). Sherborn, Mass., April 11 (*Frost*). Its known range is more southern than that of *fluminea*, extending from Massachusetts southwest in the coastwise states to Louisiana and Texas. Known also from Kansas. The southern Indiana records above given are the only ones known from the interior, and the specimens were taken from ponds in the Wabash River bottoms, the fauna and flora of the Austroriparian Life Zone extending along the stream to Vigo County. This is the largest of our eastern species and is readily distinguished from *fluminea* by the characters given in key.

1187 (1401). *BELOSTOMA TESTACEUM* (Leidy), 1847, 60.

Broadly oval. Color ranging from a nearly uniform pale brownish-yellow to dark fuscous-brown; legs dull yellow, irregularly barred or spotted with fuscous; under surface in great part fuscous, the sides of ventrals paler. Head short, obtuse. Other characters as in *fluminea*. Length, 14—18 mm.

Dunedin, LaBelle, Moore Haven and R. P. Park, Fla., Dec. 12—April 8. Recorded also from Titusville, that State. Raleigh, N. Car., August—October (*Brimley*). Mobile, Ala., January—March (*Gerhard*). Ranges from New York west to Michigan and southwest to Florida and Texas. The Florida specimens at hand are all much darker than those from North Carolina, their hue being perhaps due to the coffee-colored surface waters of the ponds and lakes in the saw palmetto regions of the former State.

Family XXXIX. NOTONECTIDÆ Leach, 1815, 124.

THE BACK-SWIMMERS.

Small or medium sized aquatic Heteroptera, so named because the upper surface is convex and obtusely keeled, thus enabling them to easily swim back downward. They have the vertex narrow, fitted wedge-shaped between the large, elongate and prominent eyes, front of head subvertical, hind one inserted in thorax to eyes and overlapped by the front of pronotum; ocelli absent; antennæ very short, 3- or 4-jointed, concealed in a cleft beneath the eyes; beak 3 or 4-jointed, short, stout, awl-shaped, its apex in repose resting in a groove on front of mesosternum; pronotum subtrapezoidal, convex, its

side margins oblique, feebly reflexed, hind margin sinuate, its median portion usually truncate; scutellum broadly triangular, its apical portion acute, prolonged between the claval commissure; elytra strongly tectiform; clavus and corium wholly coriaceous, without veins; membrane nearly similar in texture, without visible veins; front and middle legs usually shorter and stouter than the hind ones, the latter more slender, the inner side of their tibiæ and tarsi, except in *Plea*, with a dense fringe of long hairs; middle femora armed beneath near apex of outer margin with a slender tooth, this usually followed by two or three small tubercles or long setæ; abdomen usually keeled at middle, the keel as well as the sides of the ventrals with tufts of long hairs.

About 20 species of the family are known from North America. They inhabit ponds, lakes and pools of stagnant water in ditches and streams, some of the species being abundant in the masses of submerged water weeds close to the shores. Of their habits Uhler (1884, 252) says:

"All are capable of sustained flight and often go long distances in search of a congenial body of water when the food gives out or the water shallows in the place where they were born. The incessant activity of these insects in the water is very remarkable; from early morning until sundown and even later they are rising with sudden jerks from the bottom to the surface, and then diving with the hind legs in rapid motion. A spray of grass or projecting stick at the top of the water serves as a balancing point by which to sustain themselves at pleasure. Their appetite, also, seems almost insatiable. Every insect they can overcome falls a prey to their quick grasp and is held with unbending tightness until its fluids are completely withdrawn. If not picked up with caution they take the first opportunity to plunge their beak deeply into the flesh, producing a keenly smarting pain which lasts for several minutes."

The principal literature treating of our 16 eastern species is by Uhler, 1878, 1884; Kirkaldy, 1897; Champion, 1901; Bueno, 1902, 1905a, 1907b, 1909a; Hungerford, 1917, 1917a, 1917b, 1917c, 1918, 1920, 1923a, 1924a, and Bare, 1925. They are distributed among two subfamilies and three genera.

KEY TO EASTERN GENERA OF NOTONECTIDÆ.

- a. Hind legs longer than the others, their tibiæ and tarsi with a fringe of long hairs; abdomen keeled and hairy; eyes very large and conspicuous; length, 5 or more mm. (Subfamily Notonectinæ).
- b. Elytra pubescent; last antennal joint much shorter than the one preceding; scutellum almost as long as claval commissure.

I. NOTONECTA, p. 1050.

- bb.* Elytra glabrous, subhyaline; last antennal longer than the one preceding; scutellum little if any more than half the length of claval commissure. II. BUENOA, p. 1056.
- aa.* Legs of equal length, the hind tibiæ and tarsi without a fringe of hairs; abdomen not keeled or hairy; eyes small, widely separated; length less than 3 mm. (Subfamily Pleinæ). III. PLEA, p. 1060.

I. NOTONECTA Linnæus, 1758, 439.

This genus comprises our most common and best known species of the family. They possess the characters given under the family heading and in the key and have the antennæ and beak 4-jointed; front margin of pronotum truncate; prosteronum short, front legs inserted close to its hind margin; middle femora not received in grooves on the mesosternum; hind femora not reaching the apex of elytra. Eight of the 13 known North American species occur in the eastern states. Of their habits Bueno (1905a, 146) says:

"They are exceedingly active and fiercely predaceous resembling nothing so much as hawks among the vertebrates. Their principal prey are such unfortunate insects as fall into the water within the ken of the watchful water-bug, or such of the feebler aquatic insects as they can overcome, not disdaining their own young. From their position, hanging back down at or near the surface, nothing escapes them and at the slightest vibration imparted to the water by any struggling insect, or the least motion of one swimming by, they wheel swiftly about and with one or two powerful strokes of their long swimming legs are on their prey and have it seized in their strong first and second pairs of legs."

He states that the nymphs have been seen to attack and swim away with a young fish twice their size and that they "will eventually be found to be of positive economic importance not only as an enemy in fish culture, but possibly also in useful ways by the destruction of undesirable aquatic larvæ." The eggs are attached to the stems or leaves of aquatic plants, hatch in 20 to 30 days, and the adults hibernate in the mud or muck at the bottom of the pools which they inhabit.

KEY TO EASTERN SPECIES OF NOTONECTA.

- a.* Larger species, length 12 or more mm.
- b.* Greatest width of interocular area (on front of head) three times that of narrowest point near base of head (fig. 212); general color black or dark brown mottled with paler. 1188. IRRORATA.
- bb.* Greatest width of interocular area not over twice that of the narrowest point; general color white or dull yellow, often with black markings.

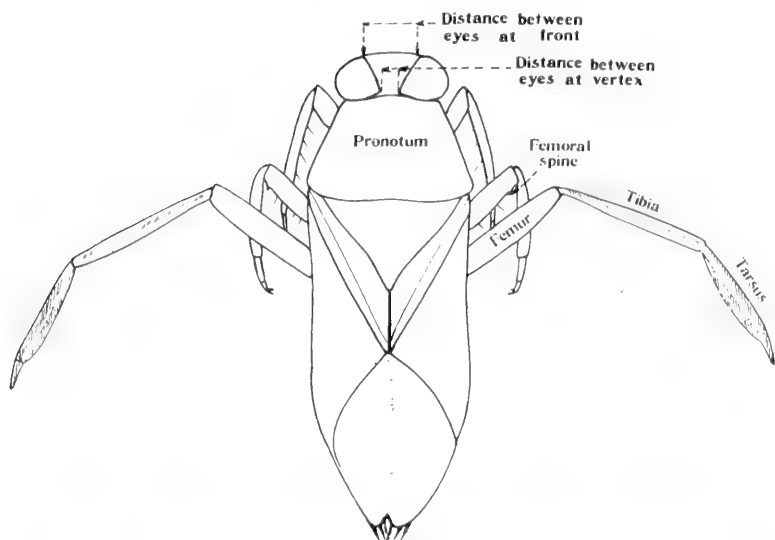


Fig. 212. Dorsal view of *Notonecta irrorata* Uhl., showing structures, X 5.
(After Garman, Hemiptera of Connecticut).

- c. Scutellum black; greatest width of interocular area less than one and a half times that of narrowest point; form less robust. 1189. INSULATA.
- cc. Scutellum pale yellow, nearly concolorous with the elytra; greatest width of interocular area about twice that of narrowest point; form very robust. 1190. BOREALIS.
- aa. Smaller species, rarely over 11.5 mm.
- d. Greatest width of interocular area not more than three times that of the narrowest point.
- e. Pronotum less than twice as wide as long; greatest width of vertex twice that of its narrowest part. 1191. HOWARDI.
- ee. Pronotum twice or more as wide as long; greatest width of vertex more than twice that of its narrowest point.
- f. Form subrobust; color dull yellow, usually with distinct black markings; greatest interocular width about two and one-third times that of narrowest point; length, 10—11.5 mm. 1192. UNDULATA.
- ff. Form more slender; color dull white, often with faint dark markings; greatest interocular width about three times that of narrowest point; length, 8—10 mm. 1193. VARIABILIS.
- dd. Greatest width of interocular area six or more times that of narrowest point.
- g. Scutellum black, elytra reddish-brown; length, 10—11.5 mm. 1194. UHLERI.
- gg. Scutellum dull yellow, elytra paler; length, 8—9 mm. 1195. RALEIGHI.

1188 (1349). *NOTONECTA IRRORATA* Uhler, 1878, 443.

Elongate, subcylindrical, convex. Head except eyes, pronotum and legs, in great part, and pleura of prosternum, dull greenish-yellow; eyes, scutellum and under surface black or dark brown; elytra dark brown mottled with dull brownish-yellow or velvety black mottled with brown; membrane fuscous-brown. Head and pronotum with scattered rather coarse shallow punctures, the latter twice as wide as long. Length, 12—15.5 mm. (Fig. 212).

Frequent throughout Indiana, especially so in the lakes and streams of the northern counties, April 11—Sept. 16. Agricultural College, Mississippi (*Wced*). Its distribution is mainly northern, extending from Quebec and New England west to Montana and southwest to North Carolina, St. Augustine, Fla., and Kansas. It varies much in the color of clavus and corium and fresh specimens often have an evanescent bluish tinge. Bueno (1905a, 146) states that both *irrorata* and *uhleri* appear to like to hide among the roots of plants growing at the water's edge, to which they cling. Hussey records *irrorata* as partial to the sluggish plant-free streams and pools in shady situations in Berrien Co., Mich., and says it was the only *Notonecta* taken in the beach drift of Lake Michigan. Near Indianapolis, I have found it most common among the water weeds along the edges of spring-fed woodland ponds in company with *Microvelia americana* (Uhl.)

1189 (1357). *NOTONECTA INSULATA* Kirby, 1837, 285.

Elongate, subcuneiform. Head and front portion of pronotum greenish-yellow; hind part of pronotum hyaline, blackish; scutellum dark velvety brown or black, its apical half rarely in part yellow; elytra dull reddish-yellow, usually with a narrow interrupted submarginal stripe, an oblique band near hind margin of corium and the tip of the latter blackish; membrane usually hyaline, blackish at base, paler toward apex; beak, legs and sides of prosternum dull yellow; under surface brownish-black, the connexivum beneath and the ventral carina greenish. Pronotum twice as wide as long, its side margins sinuate near base. Visible portion of scutellum about one-fifth wider at base than long. Length, 12.5—15.5 mm.

Staten Island, N. Y., April—September (*Davis*). Guelph, Ontario, early April; Amherst, Mass., May 19 (*Brimley*). Winnipeg, Manitoba, July—September (*Gerhard*). A species of northern distribution in the east, more southerly in the west, ranging from Quebec and New England west to the Pacific; not recorded south of Maryland in the east, but in the west known from New Mexico, Arizona and Southern California. Bueno

(1905a, 163) records it from Indiana without definite locality. It varies much in the black markings of the elytra, these in some specimens being wholly absent. The dark hue of hind part of pronotum and base of membrane is due to the black of the underlying portions as seen through the subhyaline texture. Bueno (loc. cit.) states that it "prefers to float in clear spaces in clean cold pools about midway between the bottom and the surface."

1190 (—). *NOTONECTA BOREALIS* Bueno & Hussey, 1923, 104.

Oblong, robust, strongly tectiform. Color above a nearly uniform dull yellow; scutellum paler yellow; elytra with a more or less interrupted fuscous-brown submarginal stripe; under surface brownish-black, the prosternum paler; legs and beak dull yellow, the tip of latter and the coxæ blackish. Pronotum about two-thirds wider than long, its side margins sinuate. Scutellum one-fourth wider at base than long, its apex less prolonged than in *irrorata*. Length, 12.4—14.2 mm.

Douglas Lake, Mich., July 24 (*Gerrhard*). A boreal species whose known range extends from Maine west to the Bearfoot Mountains of British Columbia. Cf its habits Hussey (loc. cit.) says: "It was noted to rank next in abundance to *N. undulata* at Douglas Lake, Mich., where it was the only *Notonecta* whose adults were found commonly before July 20. Its favorite haunts were the partially filled peat bogs, where it preferred the open water and was only very rarely taken among vegetation."

1191 (1353). *NOTONECTA HOWARDI* Bueno, 1905a, 151.

"Notocephalic lateral margins of head curved; vertex twice as wide in front as at base. Pronotum four-fifths broader than long, humeral and lateral margins sinuate. Scutellum one-fifth longer than wide, not concolorous. Hemelytra clouded with black going into smoky and with a broad black band across membrane and apex of corium; apex of membrane smoky. Corium and clavus moderately clothed with a golden pubescence. Membrane lobes subequal. Pedes: Intermediate femoral spur, small, rather blunt, concolorous. Length, 10.2 mm." (*Bueno*).

Described from Arizona. Recorded by Drake (1922a, 116) from Fayette, Miss.

1192 (1352). *NOTONECTA UNDULATA* Say, 1832, 39; I, 368.

Oblong, subcuneiform. Color above exceedingly variable, ranging from entirely uniform dull greenish-yellow to nearly wholly black. In the majority of northern examples at hand the color is very nearly that of *insulata* as above described, with the exception that the scutellum has the side margins and tip pale; in the southern individuals the scutellum and elytra except clavus are usually velvety black; under surface and

legs in great part dull yellow, in the darker forms tinged with fuscous. Pronotum not quite twice as wide as long, its front portion and the vertex of head finely, densely rugosely punctate. Scutellum at base slightly wider than its length at middle. Length, 10—12 mm.

Common throughout northern Indiana, less so in the southern counties, June—November. Dunedin and Sarasota, Fla., November—April; recorded also from St. Augustine, Lakeland and Lake City, that State. This is the most common, most widely distributed and most variable in color of our back-swimmers. Its known range covers lower Canada, the entire United States and extends south through Mexico and Central America to Chile. Six color varieties have been named, but all merge into one another. In Indiana it occurs more often in stagnant pools filled with decaying vegetation than in those with clearer purer water. Uhler (1876, 339) says that about Baltimore: "It inhabits the foulest pools, and in the dirty slush occasioned by the drainage of slaughter-houses and in the slimy ponds attached to our brick-yards, it revels as if in full enjoyment of the filth." The more robust form, shorter and less dense pubescence, usually more distinct black markings and wider basal interocular area distinguish *undulata* from *variabilis*.

1193 (1351). NOTONECTA VARIABILIS Fieber, 1851, 53.

Oblong, subcuneiform. Color above usually a nearly uniform pale straw yellow, the elytra more thickly clothed with longer paler pubescence than in *undulata*; apical third of corium often with a vague oblique fuscous bar; inner margin of clavus and disk of corium sometimes with darker stripes; scutellum and membrane usually concolorous, sometimes with their bases dusky; under surface in great part blackish, the prosternum, pleuræ and connexivum paler; beak and legs dull yellow, the tip of former and tarsal claws black. Pronotum twice as wide at base as long at middle, its front portion less densely rugose than in *undulata*. Length, 8—10 mm.

Common in the streams of the northern third of Indiana, July 18—Oct. 21; not taken south of Marshall County. Ranges from Quebec and New England west to Wisconsin and Nebraska and southwest to Florida and Kansas. The only Florida record is indefinite and may have been based on an example of *undulata*. This species is very close to *undulata* and Uhler regarded it as only a small variety of that form. Bueno regards it as distinct, and it is readily separable by the characters given under *undulata*. It occurs more often in clear running streams than in ponds, and is seldom if ever found in company with *undulata*.

1194 (1350). NOTONECTA UHLERI Kirkaldy, 1897a, 58.

Elongate, subcuneiform. Head, except eyes, pronotum, beak, except tip, and legs dull greenish-yellow; scutellum, under surface in great part and tip of beak black; elytra dark reddish-brown (crimson or orange when fresh) with outer basal angle, a large spot on apical third and tip of corium blackish; eyes brown; membrane reddish-brown, its apical half darker; connexivals each with a yellow spot beneath. Interocular area at vertex very narrow, the large eyes at that point almost contiguous. Pronotum one and four-fifths times wider than long; humeral angles prolonged somewhat downward, subacute; side margins sinuate; hind one, except near humeral angles, truncate. Length, 10.7—11.5 mm.

Dunedin, Fla., Dec. 27; one specimen from the mouth of a ditch emptying into a muck-rimmed pond (*H. S. B.*). Staten Island, N. Y., and Hyattsville, Md., August (*Davis*). Raleigh and Boardman, N. Car., Sept. 21—Nov. 21 (*Brimley*). The recorded range of this handsome and scarce species extends from Massachusetts southwestward to Florida and Louisiana, the only other known Florida specimen being in the Uhler collection without definite station. Known also from Olive Branch, southern Illinois, where Gerhard (*Ms.*) took ten specimens in September, 1909. Its habits, as far as known, are the same as those of *irrorata*. The very narrow basal portion of vertex and peculiar color easily separate it from our other eastern species.

1195 (1354). NOTONECTA RALEIGHI Bueno, 1907b, 225.

Oblong, robust, subcuneiform. Above usually a nearly uniform greenish-yellow, rather thickly pubescent with appressed yellow hairs; eyes dark reddish-brown; basal half of pronotum, scutellum and clavus often blackish by transmission of hues of the dark under parts through the subhyaline texture; corium sometimes with an interrupted submarginal stripe and the apical fifth fuscous-brown; sides of prosternum, beak, except tip, and legs dull yellow; coxæ and connexivals beneath greenish-yellow; remainder of undersurface dark brown. Interocular area at vertex narrow, only about one-fourth the width of base of eyes. Pronotum two-thirds broader than long, side margins feebly concave, hind one broadly, very feebly curved. Scutellum one-fourth wider than long, its sides sinuate. Length, 8—9 mm.

Wolf Lake, Ind., Oct. 24; New Lenox, Ill., July 5 (*Gerhard*). Hyattsville, Md., Aug. 23 (*Davis*). Raleigh and Kipling, N. Car., November—December (*Brimley*). Ranges from New Jersey west to northern Illinois and southwest to North Carolina. Allied to *variabilis*, from which it is readily separated by the more robust form and much narrower interocular area at base of eyes.

II. BUENOA Kirkaldy, 1904a, 120.

This genus, formerly included under *Anisops* Spin., comprises small, slender bodied back-swimmers, which differ from *Notonecta* mainly by the characters given in the generic key. In addition they have the antennæ and beak only 3-jointed; front margin of pronotum strongly sinuate, its middle projected forward between base of eyes; middle femora received in long deep grooves on the mesosternum; tarsi 2-jointed in both sexes; ventral carina of females projected in a point slightly beyond the tip of abdomen. The hind tarsi are, as in *Notonecta*, without claws, though stated otherwise by Fieber and Bueno. The texture of the upper surface is subhyaline, allowing the transmission of the hues of the underlying parts, and just behind the tip of scutellum there is an oval space known as the "claval orifice." The inner side of front femora of males bears a small, well defined stridular area which varies much in shape and in the number of its cross ridges (fig. 213, *g* and *h*). Hungerford (1924a) has given an interesting account of the courting of the male as follows:

"He singles out a female, maneuvers for a position some little distance beneath and behind her and begins a ticking sound as he slowly cruises nearer the object of his desire, his body quiver with emotion. When within a half inch or so of the female, the ticking changes to a hum and is followed by a sudden dash to embrace her. If she eludes him, he begins all over again or transfers his affection to another. Sometimes when a female, aware of the attentions bestowed upon her, moves away from the chirping male, the latter will turn to follow another female that may pass nearby, and resume his mating call. In a few cases one male has been observed to follow and chirp to another male. The sound produced by these insects is a ringing chick-chick-chick like the ticking of a watch that can be heard fifteen or twenty feet away. This may continue for a minute or two, and then if the male has succeeded in drawing near the female, the note changes to a rapid twir-r-r made by a very rapid continuous series of chicks. The sound is made by the shuffling back and forth of the front femora and tibiæ along the beak, both legs in unison. The roughened structures near the inner base of the tibiæ and on the inner faces of the femora rub against a scraper-like device on the base of the beak (fig. 213, *b*). A comparison of the fore limbs and beaks of the two sexes will show the modifications in the male for stridulation. They sing their courting songs at all hours of the day or night—on cloudy days or clear days, in sunshine or shadow."

The genus, as defined, is restricted to America and about 15 species have been described, several of which appear to be synonyms. Six are known from the eastern states.

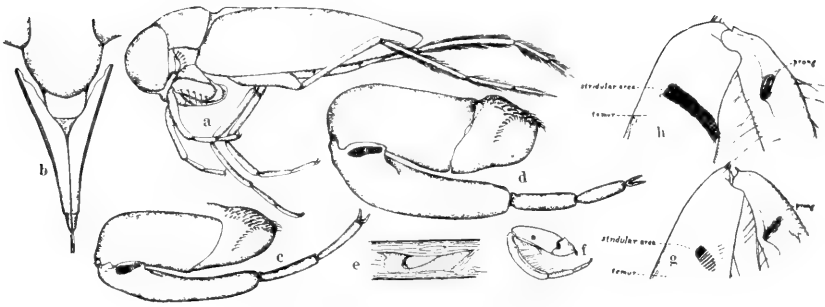


Fig. 213. STRUCTURES OF BUENOA.

a, Male of *B. limnocastoris* Hung., X 6; *b*, beak of same, showing stridular ridges on sides; *c*, inner view of front leg of same; *d*, same of *B. macrotibialis* Hung., showing the large femur and tibia; *e*, egg of *Buenoa* in situ in stem of *Juncus*, a portion of the stem removed; *f*, inner view of front leg of *B. margaritacea* Bueno, showing the tibial prominence and stridular areas; *g*, portion of front femur and tibia of same greatly enlarged, showing stridular areas; *h*, same of *B. scimitra* Bare.
(*a*—*f* After Hungerford; *g*—*h* after Bare).

KEY TO EASTERN SPECIES OF BUENOA.

- a*. Scutellum as long as or longer than pronotum, one-half or more the length of claval commissure; claval orifice less than one-third the length of scutellum.
- b*. Pronotum of males with four distinct depressions, thus appearing tricarinate.
- c*. Stridular area on front femora of males small, oval, with not more than 15 cross ridges (fig. 213, *g*); body smaller and more slender; length not over 8 mm. 1196. MARGARITACEA.
- cc*. Stridular area on front femora of males pear-shaped with about 25 cross ridges; body much larger and more robust; length, 8—9 mm. 1197. CARINATA.
- bb*. Pronotum in both sexes with very feeble or no depressions; stridular area on front femora of male sword-shaped (fig. 213, *h*), with 30 or more cross ridges; color straw-yellow without distinct blackish stripes or markings. 1198. SCIMITRA.
- aa*. Scutellum shorter than pronotum, not over one-third as long as claval commissure; claval orifice one-third or more the length of scutellum.
- e*. Smaller, less than 6 mm.; interocular area very narrow, the eyes of male subcontiguous at base; sides of body with a black stripe and apical third of elytra usually with black markings. 1199. ELEGANS.
- ee*. Larger, 6.2—7.5 mm.; interocular area wider in both sexes, one-third to one-half as wide at base of eyes as in front.
- f*. Pronotum of male not carinate, viewed from the side distinctly arched and inflated; front femora and tibiae as in fig. 213, *c*. 1200. LIMNOCASTORIS.
- ff*. Pronotum in both sexes carinate; front femora and tibiae much enlarged (fig. 213, *d*). 1201. MACROTBIALIS.

1196 (1362). BUENOA MARGARITACEA Torre-Bueno, 1908a, 238.

Elongate, subcylindrical. Color above pearly-white to pale straw-yellow, the scutellum in life usually orange-yellow; in dried specimens the bases of pronotum and scutellum, and the elytra, in part, often with

a bluish-black tinge, due to the transmitted darker hues of the under parts; eyes pale brown; under surface with sterna dull yellow, ventrals fuscous-black, the connexivals and last ventral in part paler; beak and legs dull yellow, the tip of former darker. Vertex with sides straight and subparallel, feebly widened opposite middle of eyes, the narrowest point at base one-half or more the greatest width. Pronotum of male as long as scutellum, its disk with an oblong depression each side of a narrow median carina, and a broader triangular one on each flank, the disk thus appearing tricarinate; in female slightly shorter than scutellum and with only a vague median carina; front legs as in fig. 213, *f* and *g*. Scutellum about three-fifths the length of claval commissure. Length, 6.7—8 mm.

Marion Co., Ind., Oct. 14 (*W. S. B.*). Staten Island, N. Y., Oct. 25 (*Davis*). St. Paul, Minn., Oct. 10 (*Hussey*). Ranges from Vermont and Massachusetts west to South Dakota and Kansas and southwest to Titusville, Fla. On Staten Island it was taken by Bueno and Davis in large numbers from a rock hole in a trap-rock quarry, and Hussey found it abundant in a large concrete tank at New Buffalo, Mich.

1197 (1361). *BUENOA CARINATA* Champion, 1901, 372.

Elongate, robust, smooth, shining. Color sordid white; scutellum blackish in front, testaceous behind, sometimes wholly pale; elytra with dark markings on metanotum and abdomen showing through; antennæ and legs testaceous, femora and tibiæ often with a blackish streak; ventrals black, the genitals and some spots on sides paler. Head, including eyes, nearly as wide as pronotum in male, slightly narrower, female; vertex not twice as wide in front as at base. Pronotum of male as long as scutellum, its disk with two broad, elongate depressions towards middle and a larger triangular one each side, the latter with an oblique oval elevation between them, the narrow intervals separating the depressions carina-like. Length, 8—9 mm.

Temax, Yucatan (*British Mus. Coll.*). A neotropical species recorded from Lakeland, Fla., by Barber, and from New Mexico and California by Uhler. It is very doubtful whether the true *carinata* occurs east of the Mississippi, the "Southern United States" record of Champion being based upon a doubtful determination of the *Anisops platynecmis* of Uhler (1884, 253), now known as *B. margaritacea* Bueno. The specimens received from W. E. China bear out his statement that "*carinata* is a much larger and more robust species than *margaritacea*, being almost nearly one-half as big again."

1198 (—). *BUENOA SCIMITRA* Bare, 1925, 226.

Smaller and more slender than *margaritacea*. General color as in key; eyes brown; scutellum orange-yellow; legs and sterna mostly pale,

middle of ventrals, sides of dorsals, inner and outer faces of front femora and coxæ and tarsal claws, blackish-brown. Head of male across eyes slightly wider than pronotum; vertex widest at middle, where it is two-thirds wider than at base or between front of eyes, in female less narrowed between front of eyes. Pronotum in dried specimens of male with vague depressions and a ridge each side; in females and fresh specimens of male, scarcely impressed. Claval orifice very small, about one-fifth the length of scutellum; commissure hirsute, one-third longer than scutellum. Males with stridular area of front femur as in key, and fig. 213, *h*, very distinctive. Length, 6.5—7.5 mm.

Raleigh, N. Car., Sept. 15—Oct. 16; determined by China. Described from Kansas and heretofore recorded only from there.

1199 (1364). BUENO ELEGANS (Fieber), 1851, 61.

Elongate, slender, subcuneiform. Above pale straw- or whitish-yellow; eyes pale brown with scattered darker spots; lower margin of pronotum with a shining black stripe which extends back to middle of costal margin of corium; elytra usually with apical fourth of corium shining black, and a vague piceous stripe along outer margin of clavus; sterna and legs dull yellow, the latter often with a fuscous tinge; ventrals dark brown, the sixth in part paler. Greatest width of vertex more than twice that at narrowest point. Pronotum of male one-fourth longer than scutellum, its disk with a shallow central impression divided by a vague median carina; commissure nearly four times as long as scutellum; female with pronotum scarcely longer than scutellum, its disk with a feeble median carina. Length, 5—5.5 mm.

Clark Junction, Lake Co., Ind., Aug. 7; Douglas Co., Kans., November (*Gerhard*). White Plains, N. Y., Aug. 29; Palisades, N. J., Sept. 5 (*Davis*). Staten Island, N. Y.; Ft. Lee, N. J., and Raleigh, N. Car. (*Brimley*). Dunedin, Fla., Nov. 24—March 10; numerous specimens taken from amongst the grasses and water weeds along the shallow margins of ponds. The first record for the State (*W. S. B.*). The known range extends from Maine west to Michigan and Kansas and south to Florida. Most of the specimens received were labelled *B. platynemisi* Fieb., but they differed only in being of a darker hue, the distinctions given by Bueno (1909, 77) being comparative only, not fixed. The name *platynemisi* has served as a "catch-all" for undetermined species of the genus since Uhler (1884) used it for the only species he at that time knew.

1200 (—). BUENO LIMNOCASTORIS Hungerford, 1923a, 150.

Differs from *elegans* mainly by the characters given in key. Dark markings more prominent, there being usually, in addition to those of

elegans, a rather large black or dusky spot on the flanks of pronotum; sides of pro- and mesosterna and ventrals all dark brown, shining; beak, femora and hind tibiæ each with a piceous stripe. Scutellum shorter than in *elegans*, one-half the length of pronotum, male, two-thirds, female. Claval orifice two-thirds the length of scutellum in both sexes. Length, 6.2—7 mm. (Fig. 213, *a*).

Douglas Lake, Mich., Aug. 15 (*Gerhard*). Described from Cook Co., Minn., where numerous specimens were taken by Hungerford from the "amber-colored waters of a large beaver-pond. Like the smaller *B. elegans* it swims in the shallow protected waters along the shore."

1201 (—). BUENOA MACROTIBIALIS Hungerford, 1924a, 225.

Sordid white, sometimes with small dark spots on sides of thorax and abdomen. Eyes, as seen from the side, more convex in front and flatter above than in our other species. Pronotum of both sexes with a distinct median longitudinal carina, its apex projected conspicuously and acutely between the eyes. Scutellum one-half as long as pronotum, male; slightly shorter than pronotum, female. Male with front femora much thickened, tibiæ very broad and flat (fig. 213, *d*). Length, 6.2—7.5 mm.

Described from Douglas Lake, Mich., and Pelican Rapids, Minn., and recorded only from those two stations.

III. PLEA Leach, 1817, 11.

Very short, compact, strongly convex Notonectids having the head subvertical, very wide between the eyes; beak 3-jointed, awl-shaped, reaching middle coxæ; pronotum arched, one-half wider than long, front margin truncate, hind one broadly rounded; scutellum triangular, its sides subequal, apex acute; elytra conjointly oval, strongly convex, narrowed behind, meeting in a straight line along the dorsum, closely fitted over the abdomen, membrane absent. Other characters as in generic key. Two species occur in North America, both in our territory.

KEY TO EASTERN SPECIES OF PLEA.

- a*. Elytral sutures between clavus and corium usually faint or absent; color dull yellow without distinct fuscous marks; head with a reddish-brown streak between the eyes. 1202. STRIOLA.
- aaa*. Elytral sutures distinct; fuscous markings prominent; head with a large triangular dark spot between the eyes. 1203. HARNEDI.

1202 (1365). PLEA STRIOLA Fieber, 1844, 18.

Short, oval; body deeper than wide. Above grayish- or greenish-yellow, shining, glabrous; eyes brown; beak and under surface dark brown, pubescent. Head, pronotum and elytra coarsely, evenly, not

densely punctate. Scutellum more sparsely and irregularly punctate. Elytra with sides strongly declivent. Other characters as under generic heading. Length, 1.8—2.2 mm. (Fig. 214).

Marion Co., Ind., Sept. 23; taken from among water weeds along the edges of a pond largely filled with calcareous sediment; probably occurs throughout the State. Dunedin and Ft. Myers, Fla., Nov. 24—April 6. Common in ponds about Dunedin and numerous specimens taken at Ft. Myers from the muck of an extinct wet weather pond. No previous definite Florida station has been recorded. Ranges from New England west to Illinois and Kansas, and southwest to Florida, Texas, Southern California, Central America and the West Indies. Bueno (1905b, 47) says of it: "This small bug is abundant from early spring until late fall, hiding among the fine-leaved aquatic plants and algæ, where it swims about in quest of food, crawling on the stems and the matted fibers." It feeds mainly on *Entomostraca* and the eggs are inserted in the soft tissues of water plants. A robust specimen at hand from Ft. Myers, Fla., has the claval suture distinct, punctures much more dense, each enclosing a short seta; base of pronotum more broadly rounded, with hind margin less concave. Aside from color it appears to be an intermediate form between *striola* and *harnedi*.

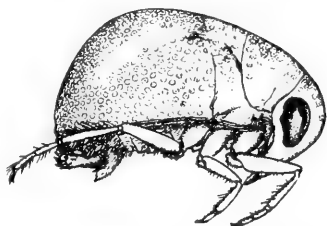


Fig. 214. Female with ovipositor exerted, X 18. (After Hungerford).

1203 (—). *PLEA HARNEDI* Drake, 1922a, 114.

Yellowish-gray with prominent fuscous markings. Head as in key; pronotum largely fuscous, an oblong spot behind middle of front margin, sides and hind margin, grayish-yellow; scutellum fuscous, tip paler; clavus and an irregular stripe along middle of corium fuscous; legs yellowish-brown, coxæ and trochanters blackish, tips of femora and third tarsal fuscous; beak and under surface blackish. Elytra short, strongly declivent behind. Dorsal surface somewhat flattened at the scutellum. Other characters as in key. Length, 2.3 mm.

Described from Fayette, Miss.; not recorded elsewhere. It is very probable that this will prove to be only a color form of *P. striola*. The distinctness of the claval suture is, as shown above, a variable and unreliable character.

Family XL. CORIXIDÆ¹⁰⁴ Leach, 1815, 124.

THE WATER-BOATMEN.

Oblong or oblong-oval aquatic Heteroptera of medium or small size, having the body subdepressed above, more so beneath; head short, wide, its front vertical, usually bluntly rounded; eyes very large, oval, feebly convex, coarsely granulated, overlapping the front margin of pronotum; ocelli wanting; beak short, scarcely differentiated from the face, the mouth opening being on its front end; antennæ 4-jointed, in repose concealed beneath the head, joint 3 longest, 4 setaceous; pronotum transverse, subpentagonal, its hind margin obtusely triangular, in our species covering the scutellum; elytra coriaceous, entire, covering the abdomen, often thinly pubescent, the usual divisions usually distinct; clavus large, its commissure very long; membrane of same texture as corium, without veins; front legs short, their tarsi stout, 1-jointed, flattened and usually fimbriate beneath; middle legs longest, very slender, their tarsi ending in two long, very slender claws; hind tibiæ and tarsi compressed, fringed with long hairs, the tarsi 2-jointed, claws wanting.

The males differ widely from the females in having the last three ventral segments distorted or asymmetrical (fig. 215, *f*), twisted (as viewed from beneath) either to the right (*dextral*) or left (*sinistral*). They also have apparently two sets of stridulating organs, one on one side of the dorsum called the "strigil" (pl. XII, fig. 1) and composed "of rows of very closely packed intensely black comb-like plates." The other is on the front tarsi (or "palæ") which are provided with one or two rows of chitinous "pegs" or teeth. By rubbing these back and forth over a roughened area on the femur of the other fore leg, a twittering sound or mating call is produced. The females lack these pegs and their ventral segments are perfectly regular (fig. 215, *g*). The front legs are used mainly for prehending food (fig. 215, *h*), the long slender middle ones for

¹⁰⁴My treatment of this family is not such as I would wish. As stated on page 6 of this work, I was unable to borrow examples of a number of the species not in my collection, as the great majority of those from the various private cabinets of this country (some of my own included) are, and have been for several years, in the hands of the professed leading authority on the group. He not only ignored my several requests for a loan of such species as I do not possess, but wrote that: "I realize that the treatment of the Corixidæ in your forthcoming work will be a practically valueless contribution." In order to make it the more worthy in his eyes I asked him to prepare the chapter on our eastern species, stating that I would publish it under his name. This offer he also ignored. My work on the family is, therefore, included as the best that I could do with the facilities at my command.

anchoring themselves to some submerged object while feeding and the fringed hind ones for swimming or for cleaning the body of accumulated ooze. Both adults and nymphs gather their food supply from ooze at the bottom of the pool which they inhabit. It consists mainly of remnants of aquatic plants, such as *Spirogyra*, *Zygnema*, etc., together with such minute forms of animal life as they may at the same time gather in. More than 150 species of the family are known, distributed in all countries of the world. In Mexico and Egypt certain species are used as food by the natives and others are collected and sold in quantities for the food of cage birds. Of their habits Uhler (1884, 251) says:

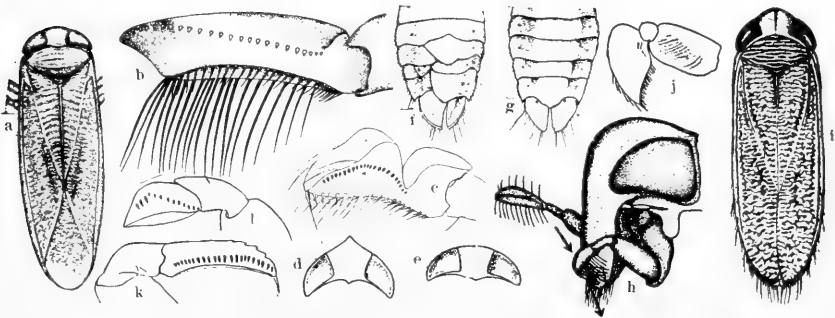


Fig. 215. STRUCTURES OF CORIXIDÆ.

a, Adult of *Arcticorixa alternata* (Say), X 6; b, pala of male of *A. obliqua* Hung.; c, pala of male of *Ramphocorixa acuminata* (Uhl.); d and e, heads of male and female of same species from above; f, ventral view of male abdomen of *A. alternata*, showing the peculiar asymmetry of the terminal segments; g, same of female, showing regularity of segments; h, side view of head and front legs of a *Corixid*, illustrating the process of food gathering, one fore leg with stylets exerted passing food material across the face and over the mouth opening, the other stretched out in the act of gathering material; i, adult male of *Palmarcorixa buenoi* Abb.; j, pala of male of *P. gilletti* Abb.; k, pala of male of *A. gordita* Abb.; l, pala of male of *Corixa macroceps* Kirk. (After Hungerford and Abbott).

"These insects are truly aquatic, but they occasionally leave the water and during their nocturnal flights are drawn to the lights in our houses, into which they dash with headlong precipitation. They live on the bottom in puddles, ponds and running waters and where there is no current may be seen balanced with the neatest delicacy by the tips of their intermediate feet, stationed in the midst of their young at intervals of a few inches; then, by reason of some disturbance, dashing away with rapid strokes of the posterior paddles. When they arise to the surface to take in a fresh supply of air they rest horizontally for an instant with the long middle legs extended forward and the sides and ventral margin become glazed with an air-film which shines like translucent silver."

Abbott (1923, 386) says: "They swim through the water, back uppermost, in irregular rapid jerks and as a rule spend the greater part of the time near the bottom clinging to sticks

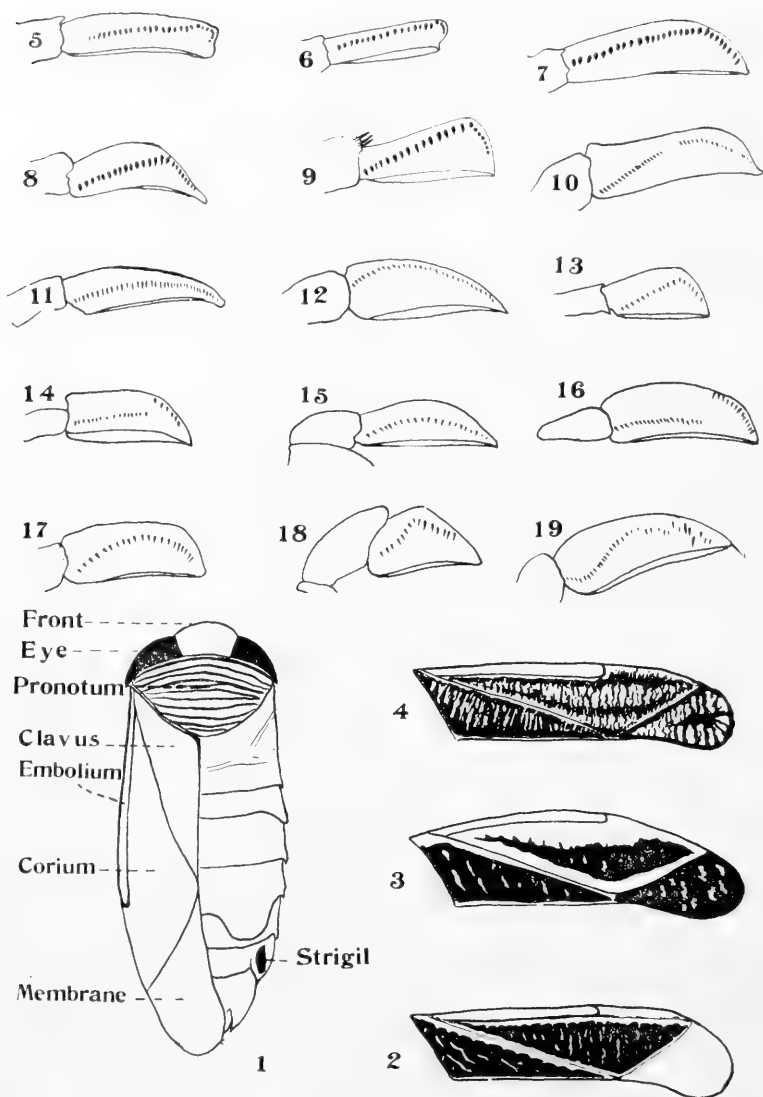


Plate XII. STRUCTURES OF CORIXIDÆ.

Fig. 1. *Arctocorixa interrupta* (Say) with right elytron removed and lineations of the left one omitted, to show structural parts of a Corixid. Figs. 2—4, right elytron of *Arctocorixa*, showing coloration; 2, of *A. kennicottii* (Uhl.); 3, *A. lucida* Abb.; 4, *A. ornata* Abb. Figs. 5—19, Front tarsus of male Corixids, showing pala and paler pegs; 5, of *Arctocorixa interrupta* (Say); 6, *A. nitida* (Fieb.); 7, *A. kennicottii* (Uhl.); 8, *A. harrisii* (Uhl.); 9, *A. lucida* Abb.; 10, *A. ornata* Abb.; 11, *A. alternata* (Say); 12, *A. parshleyi* Abb.; 13, *A. seriata* Abb.; 14, *A. trilineata* (Prov.); 15, *A. compressa* Abb.; 16, *Callicorixa præusta* (Fieb.); 17, *Arctocorixa scabra* Abb.; 18, *Corixa verticalis* (Fieb.); 19, *Palmacorixa buenoi* Abb.

(After Abbott in Hemiptera of Connecticut).

or water-weeds. The cross-barred markings of the tegmina, characteristic of nearly every representative of the family, are doubtless of great value in aiding the insect to escape observation, on account of the consequent resemblance to the debris to which they cling."

About 50 species, representing seven genera, have been described from the eastern states. On account of their close resemblance their classification is very difficult, there being no satisfactory keys to species extant. The principal available literature treating of them is by Uhler, 1884; Champion, 1901; Kirkaldy, 1908; Hungerford, 1917d, 1920, 1925a; Abbott, 1912, 1912a, 1913, 1913a, 1915, 1916, 1923, and Bare, 1925.

KEY TO EASTERN GENERA OF CORIXIDÆ.

- a. Front tibiæ not produced over the base of palæ in the form of a spur; asymmetry of male ventrals (except in *Callicorixa* and *Arctocorixa edulis*) on the right side.
- b. Inner wings present and functional.
- c. Strigil absent.
 - d. Stridular area on front femur present; hind tarsi usually marked conspicuously with black; palæ of male with pegs in two rows (fig. 16^{104a}). I. *CALLICORIXA*, p. 1066.
 - dd. Stridular area absent; hind tarsi not marked with black; palæ without pegs; pronotum dark olive-green without transverse stripes. II. *CYMATIA*, p. 1066.
- cc. Strigil present, on the right side; tegmina without short black hairs; pegs of palæ in a single, often irregular row.
- e. Upper surface of male palæ deeply incised near middle so as to be almost cut into two parts (fig. 215, c); strigil very minute; head of male distinctly acuminate (fig. 215, d).
 - III. *RAMPHOCORIXA*, p. 1067.
- ee. Upper surface of palæ without deep incisures; strigil larger, distinct; head of male rounded.
 - f. Pronotum transversely lineate, usually rastrate; tegmina more or less rastrate. IV. *ARCTOCORIXA*, p. 1068.
 - ff. Pronotum without lineations, not rastrate; elytra smooth, polished; color, in the only known species, brownish-yellow or pale reddish-brown, base of clavus and a large spot near apex of corium blackish. V. *HESPEROCORIXA*, p. 1081.
- bb. Inner wings absent or rudimentary; head with hind angles prolonged, prominent; palæ with pegs in one interrupted row, or in two rows (pl. XII, fig. 19; fig. 215, j). VI. *PALMACORIXA*, p. 1082.
- aa. Front tibiæ of males produced over the base of palæ in the form of a blunt spur (fig. 18); asymmetry and strigil on the left; surface of pronotum and elytra usually smooth and shining.

VII. *CORIXA*, p. 1083.

^{104a} The figures cited in key and text of this family (with the exception of fig. 215) refer to those on plate XII, p. 1064.

I. CALLICORIXA White, 1873, 62.

The principal characters distinguishing this genus are given in the key. Two species have been recorded from the eastern states.

KEY TO EASTERN SPECIES OF CALLICORIXA.

- a. Elytra glabrous, distinctly rastrate over the entire surface; pale lineations of elytra nearly straight and transverse throughout. 1204. PRÆUSTA.
 aa. Elytra thickly pubescent, minutely punctate, the clavus alone very finely obsoletely rastrate; pale lineations of elytra irregularly vermiculate, becoming transverse and straight only on base of clavus. 1205. KOLLARII.

1204 (1416). CALLICORIXA PRÆUSTA (Fieber), 1848, 521; 1851a, 28.

Pale fuscous with yellowish lines; head yellowish, tylus rufo-fuscous; pronotum with seven or eight narrow blackish cross-bars; pale lines of elytra, including membrane, transverse, undulated, subparallel, often abbreviated; dorsum, meso- and metasterna, xyphus and prosternal lobes, black; embolium pale, darker at base; legs pale, base of front femora and upper face of tibiæ with oblong blackish spots. Frontal impression of male oblong, reaching middle of eyes. Palæ and pegs as in fig. 16. Length, 6.7 mm.

Hendon and Nazeing, England, April 2—July 6 (*British Mus. Coll.*). A palæarctic species, recorded in this country from Canada, New England, Michigan and Alaska. The northern records of *C. kollarii* probably belong here.

1205 (1417). CALLICORIXA KOLLARII (Fieber), 1851a, 17.

Oblong, robust. Pale fuscous, shining; head yellow; pronotum obsoletely rastrate, not carinate, with six or seven transverse fuscous lines, these narrower than the alternate pale spaces; elytra blackish-fuscous, closely marked with short, irregular, undulate transverse pale lines; embolium sordid-white; legs wholly pale. Male with frontal impression oval, deep, very large; front tibiæ acutely, triangularly dilated; pala subsemicircular, acute. Length, 6.5—6.7 mm.

Antigua, West Indies (*British Mus. Coll.*). Described from Brazil and Cuba and recorded by Uhler (1894a, 224) under the name *Corisa cubæ* (nec. Guerin) from Florida. The northern records given by Kirkaldy, Bueno and others probably belong to *præusta*.

II. CYMATIA Flor, 1860, 783.

Head with eyes broader than pronotum; vertex horizontal, projecting between the eyes, with a more or less distinct carina; front feebly concave, male, flat, female; pronotum broader than long, the front half with a median carina; pala

subcylindrical, slightly curved inwardly, about five times as long as thick, nearly three times as long as tibiæ, ending in a single claw, about one-third as long as pala itself and with two rows of long bristles. Other characters as in key. Five species are known, one from North America.

1206 (—). *CYMATIA AMERICANA* Hussey, 1920, 82.

Head green, vertex with two large brown spots on hind margin; pronotum as in key; elytra olive-green, clavus with oblique black lines, these heaviest near base, there often broken or with outer end forked, corium sparsely and irregularly punctate with black and with numerous irregular blackish spots, these tending to form two or three irregular longitudinal rows; costal area whitish, its outer edge blackish posteriorly; membrane narrow, lightly spotted with fuscous; legs dull yellow; ventrals blackish, male, greenish, female. Front of head feebly concave, male, flat, female, clothed with long erect whitish pubescence; vertex about one-fourth narrower at base than in front. Pronotum about twice as wide as long, carinate in front. Length, 7.4—8.3 mm.

Recorded only from Michigan, Minnesota and North Dakota. Hussey reports it as hibernating in groups of 10 to 50 individuals in air pockets in the ice covering a small pond near St. Paul, Minn.

III. *RAMPHOCORIXA* Abbott, 1912, 120.

Species of medium size having the head of male sharply acuminate, strongly carinate, about one-third longer than pronotum, its frontal fovea acorn-shaped; pronotum lenticular, rastrate; palæ as in generic key, shining ivory-white, much longer than tibiæ, terminated by a long serrated spine; front femur with a large stridular area of minute spines. Male with asymmetry of apical ventrals dextral, dorsal segments 5—7 divided, the strigil minute. Female with a small circular fovea between the lower inner angles of the eyes; palæ oblong, cultrate. One species is known.

1207 (1421). *RAMPHOCORIXA ACUMINATA* (Uhler), 1897a, 392.

Narrow, shining, minutely rastrate, bluntly rounded behind. Head yellowish; pronotum grayish-brown with three complete and two shorter brown lines; elytra pale silvery-gray, the usual transverse dark marking very faint; membrane subhyaline, margined with brown, male; dorsum black edged with paler; under surface white, ventrals 3—5 with two oblong black bands each side, genital segments pale; female with dorsum, legs and ventrals pure white. Structural characters as under genus heading. Length, 4.3—5.5 mm.

Eastland Co., Tex., May 24 (*British Mus. Coll.*). Recorded from northern Illinois, Missouri, Kansas and Texas. It is

said to occur only in the muddiest of ponds, to winter as adult and to fasten its eggs during June and July to the bodies of crayfish, as many as 3,000 having been noted attached to one of these crustaceans. The *R. balanodis* Abb. (1912, 118) is a synonym.

IV. ARCTOCORIXA Wallengren, 1894, 133, 150.

To this genus, as characterized in the key, belong the large majority of our eastern species. They range in length from 3 to 11 mm. and have both pronotum and elytra usually marked with numerous transverse alternate pale and dark lines or cross-bars, their surface in part or wholly rastrate or roughened like a file. Front of head of males usually with a large concavity or impression; in females flat or convex. As the species are so numerous they are, for convenience, treated in two groups, the division being based on size alone.

KEY TO GROUPS OF EASTERN ARCTOCORIXA.

- a.* Larger, length (except in *nitida* var. *minor*) 8 or more mm. GROUP I, p. 1068.
- aa.* Smaller, length less than 8 mm. GROUP II, p. 1073.

GROUP I.—ARCTOCORIXA.¹⁰⁵

KEY TO EASTERN SPECIES OF GROUP I. ARCTOCORIXA.

- a.* Pronotum without a percurrent median carina and with not more than 11 transverse pale lines.
- b.* Lineations, or pale markings of elytra, distinct and covering the corium.
- c.* Palæ of male narrow, oblong or strap-shaped, the pegs in a nearly straight row (figs. 5 and 6).
- d.* Length, 10—11 mm.; suture between corium and membrane concolorous, the lineations continuous across both divisions; palæ of male strap-shaped; pegs 26—30. 1208. INTERRUPTA.
- dd.* Length, 8—9 mm.; suture between corium and membrane usually marked by a yellowish line; palæ of male oblong, shorter in proportion to their width; pegs 21—24. (fig. 6). 1209. NITIDA.
- cc.* Palæ of male broader, not oblong or strap-shaped.
- e.* Pale bands of corium behind apex of commissure short, irregular in shape, giving a mottled rather than a cross-striped effect.
- f.* Pronotum more finely rastrate, crossed by ten or more dark bands.
- g.* Palæ of male with apex decurved, the row of pegs bent downward (fig. 8); several of the pale pronotal cross lines confluent at the ends. 1210. HARRISI.

¹⁰⁵The *A. planifrons* (Kirby) is not included in the key. A description of *A. bavigata* (Uhl.), the No. 1253 of this work, was not available in time for its proper placement in either key or text. It should follow *A. concava* (Fieb.) on p. 1072.

- gg.* Palæ of male with apex obliquely produced, not decurved, the rows of pegs in a straight line (fig. 215, *b*); pale cross lines of pronotum not confluent. 1211. *OBLIQUA*.
- ff.* Pronotum strongly rastrate, crossed by about eight dark bands. 1212. *LOBATA*.
- ee.* Pale bands of corium behind apex of commissure forming transverse parallel series; width of vertex at base but about one-fifth less than width of eye. 1213. *VULGARIS*.
- bb.* Pale lineations of elytra tending to coalesce into a solid color or longitudinal rows (pl. XII, fig. 4); length, 8—9 mm.
- h.* Membrane with regular lineations or vermicular markings like those of corium (fig. 4).
- i.* Pronotum with four or five indefinite dark bands; pegs 36 in a single curved interrupted row (fig. 10); surface strongly rastrate. 1214. *ORNATA*.
- ii.* Pronotum with eight dark bands; pegs 37, in an entire row, the apical 12—14 about three times as long as the basal ones; surface less rastrate. 1215. *DECORATA*.
- hh.* Membrane with obscure or no lineations (pl. XII, figs. 2 and 3); pegs not over 30.
- j.* Hind angle of corium without a V-shaped yellow band.
- k.* Sides of body parallel; lineations coalescent, the corium black, its margin yellow (fig. 2); pegs 29—30 (fig. 7). 1216. *KENNICOTTII*.
- kk.* Body broadest behind middle; corium blackish at inner apical angle, its outer margins and embolium pale (fig. 3); pronotum strongly rastrate and with 7 or 8 very narrow black lines; pegs 22 (fig. 9). 1217. *LUCIDA*.
- jj.* Hind angle of corium conspicuously bordered by a V-shaped yellow band; palæ oblong-cultrate; pegs 27, crowded toward apex. 1218. *DUBIA*.
- aa.* Pronotum with 12 or 13 narrow transverse yellowish lines and with a percurrent median carina. 1219. *CONVEXA*.
- 1208 (1437). *ARCTOCORIXA INTERRUPTA* (Say), 1825, 328; II, 250.

Oblong, subparallel, robust for the genus. Above fuscous-brown, darker in males; pronotum with hind margin obtuse-angled; disk with about ten narrow black transverse lines, the three or four median ones usually interrupted or branched; elytra with very numerous zigzag similar lines, those on apical half less irregular than in *obliqua* and *lobata*; legs and front of head pale dull greenish-yellow; costal margin blackish at base and again at apical third; prosternum blackish; meso- and metapleura, and often in part the abdomen, fuscous or tinged with dusky. Pronotum and elytra finely and vaguely rastrate. Male with frontal impression large-oval, the narrow end below; pala as in key and pl. XII, fig. 5; widely grooved on outer side, fringed on lower edge with numerous long bristle-like hairs. Length, 10—11 mm.

Frequent throughout Indiana, April—November, especially so in spring-fed ponds and pools of streams. Ranges from New

England west to the Pacific and south to Georgia, its general distribution being northern.

1209 (1444). *ARCTOCORIXA NITIDA* (Fieber), 1851a, 28.

Form of *interrupta*, its sides more parallel. Color much the same; pronotum with 8 or 9 transverse black lines, the median ones not interrupted or confused as in *interrupta*, but one of them usually very short; under surface usually yellow with a black spot behind the front coxæ; sides of abdomen often in part fuscous. Pronotum narrower than in *interrupta*, its hind margin broadly rounded. Length, 8—9.5 mm.

Marion Co., Ind., April 1—Oct. 9. Raleigh and Laurel Hill, N. Car., June—November (*Brimley*). Staten Island, N. Y. (*Davis*). In Indiana it occurs more often in stagnant woodland ponds than in those fed by spring branches. Recorded heretofore only from Maryland, North Carolina and Georgia.

1209a (1444a). *ARCTOCORIXA NITIDA MINOR* Abbott, 1913, 82.

Differs from typical *nitida* in its smaller size and in having a clear yellowish spot near apex of corium with a small black one behind it. Length, 7.3—8 mm.

Raleigh and Laurel Hill, N. Car., June—November (*Brimley*). Recorded only from Massachusetts, Georgia and North Carolina. It may prove to be a distinct species.

1210 (1434). *ARCTOCORIXA HARRISII* (Uhler), 1878, 444.

Head pale yellowish, slightly broader than pronotum, frontal impression oblong-oval, thinly beset with long yellowish hairs; pronotum fuscous-brown with 10 or 11 narrow yellow slightly curved cross-lines which do not touch the side margins, two or three on the disk and the hindmost one uniting at one end with the one preceding or succeeding; elytra with yellow cross-lines, especially those toward apex, each interrupted to form three or four oblong curved or zigzag pale marks; legs yellow. Pala of male as in pl. XII, fig. 8. Length, 9 mm.

Marion Co., Ind., April 16. Described from Massachusetts. Ranges from New England west to Indiana. Treated by Abbott (1923) as a form of *interrupta*, but by Hungerford (1925a) considered distinct.

1211 (—). *ARCTOCORIXA OBLIQUA* Hungerford, 1925a, 142.

Dark fuscous-brown; head and legs pale yellow; eyes black; pronotum crossed by nine or ten pale lines, these more narrow than the alternate dark ones; elytra with pale cross-marks on basal half transverse and wavy or zigzag, those near inner basal angle of clavus broader than the others, those behind commissure and on membrane more broken and irregular. Head short; vertex with sides subparallel, at base only about two-thirds as wide as hind margin of eye; frontal depression of male deep, ovate, the apex below. Pronotum and elytra finely rastrate, the

former with an evident, but faint median carina, the latter finely pubescent. Pala of male as in fig. 215, *b*. Length, 10—11 mm.

Marion Co., Ind., Aug. 16—Oct. 9; common among masses of water-weeds in spring-fed ponds. Ranges from New York and New Jersey west to Minnesota and Kansas and southwest to Oklahoma and Texas.

1212 (—). *ARCTOCORIXA LOBATA* Hungerford, 1925a, 143.

Dark brown; head, legs and ventrals yellow; pronotum crossed by about eight broad black bands; elytra with pale markings much as in *obliqua*. Membrane more or less separated from corium by fusion of the pale cross-lines. Male with frontal depression of head less distinct, its sides reaching the eyes. Pronotum coarsely rastrate, its median carina scarcely evident. Pala of males elongate, sides nearly parallel, slightly broader near the rounded tip. Left clasper of male with a prominent lobe in front of base of right one. Length, 9.4 mm.

Recorded only from Long Island, N. Y., and St. Paul, Minn.

1213 (—). *ARCTOCORIXA VULGARIS* Hungerford, 1925a, 143.

Dark brown; vertex and legs reddish-brown, front dull yellow; pronotum with 9—11 narrow yellowish cross-lines; elytra with pale cross-lines transverse and parallel, much less waved and broken than in any of its allies, more broken and irregular on the membrane; ventrals dark, those of male tinged with reddish. Frontal depression of male long and deep, its sides not reaching eyes; base of vertex one-fourth narrower than base of eye. Pronotum and elytra rastrate. Length, 9—10 mm.

Sudbury, Mass., May 3 (*Frost*). Ranges from there west to Ohio and South Dakota.

1214 (1444¼). *ARCTOCORIXA ORNATA* Abbott, 1916, 341.

Sides parallel. Tawny yellow with umber markings; pronotum with only four or five pale cross-lines; pale lines of elytra coalescent as in pl. XII, fig. 4; membrane with a central dark stripe from which radiate pale markings. Head wider than pronotum; frontal impression of male, elongate-ovate, large and conspicuous. Upper surface strongly rastrate. Palæ as in pl. XII, fig. 10. Length, 9 mm.

Recorded from New England and Ithaca, N. Y.

1215 (1426½). *ARCTOCORIXA DECORATA* Abbott, 1916, 341.

Dull yellow with dark brown markings; pronotum with eight dark cross-lines; cross-lines of clavus broad, somewhat forked, those of corium tending to coalesce into indefinite longitudinal lineations; membrane with numerous vermiculate markings. Frontal depression of male small, shallow, barely exceeding the eye. Pala falcate; pegs 37, the apical 13—14 ones three times the length of the others. Length, 9 mm.

Recorded only from Massachusetts.

1216 (1438). *ARCTOCORIXA KENNICOTTII* (Uhler), 1897a, 393.

Dark reddish-brown with yellowish markings, head whitish; pronotum with six or seven narrow yellowish lines; basal third of clavus with yellow lines wide, their outer ends forked; apical two-thirds with three rows of vague pale flecks and another row touching the yellow sutural line; corium as in key, with pale markings as in fig. 2; dorsum and ventrals blackish, the margins and legs yellowish. Frontal depression of male small, shallow, bounded by coarse punctures. Pronotum coarsely rastrate, elytra very finely so. Pala as in pl. XII, fig. 7. Length, 8—9 mm.

Ranges from New England west to Illinois. Uhler says it is: "Common in the Coastal region and in shallow pools, heated by the sun's rays, these insects are cooked of a red color."

1217 (1442½). *ARCTOCORIXA LUCIDA* Abbott, 1916, 341.

Elongate, widest behind middle. Dull yellow, pronotum and elytra with color and markings as in key and fig. 3; head yellow; under surface in great part blackish, the sides of ventrals yellow; legs and head greenish-yellow. Male with frontal depression ovate, reaching middle of eyes; pala short with apex widened and subtruncate; pegs 20—22, the row abruptly bent (pl. XII, fig. 9). Length, 8.7—9 mm.

Raleigh, N. Car., Nov. 17 (*Brimley*). Recorded only from Rhode Island, Massachusetts and Connecticut. The strongly rastrate pronotum with narrow vague lineations, the arrangement of black hues on the elytra and the fewer pegs distinguish this from its allies.

1218 (1427½). *ARCTOCORIXA DUBIA* Abbott, 1916, 342.

Chestnut-brown, shining, finely rastrate. Pronotum with eight rather broad, straight and unbroken yellow cross-lines; lineations of clavus, corium and membrane uniformly coalescent to form a dark background with narrow flecks of a paler hue. Frontal depression shallow, not reaching middle of eyes. Pala as in key. Length, 8.5 mm.

Recorded only from Maine and Massachusetts.

1219 (1425). *ARCTOCORIXA CONVEXA* (Fieber), 1851a, 37.

Reddish-brown with yellow lines; vertex fuscous, subangulate. Pronotum elongate, convex, rastrate, with median carina distinct, percurrent and with 12—13 narrow transverse yellowish lines. Elytra densely pilose; clavus rastrate, its basal pale lines entire, transverse, parallel, remainder more narrow, abbreviated, sometimes forked; corium punctate, its pale lines short, undulate or angulate, sinuous or forked; membrane with sutural line and marginal area sordid, disk with a median black stripe; embolium blackish toward base; legs pale, middle femora and tarsi annulate with fuscous; three or four basal ventrals black. Pala of female cultrate, acute. Length, 9 mm.

Described from Labrador. Not recorded elsewhere. Males apparently unknown.

1220 (1446). *ARCTOCORIXA PLANIFRONS* (Kirby), 1857, 284.

"Head yellow; under surface black with two pale spots each side of breast; occiput obtuse-angulate at middle, front blunt; prothorax carinated, brownish-black, transversely streaked with pale yellow; hemelytra brownish-black, sprinkled with yellow; anal half of abdomen pale yellow. Length, 4 lines (8 mm.)." (*Kirby*).

Described from Canada; not recorded elsewhere.

GROUP II.—ARCTOCORIXA.

This group comprises a large number of species from the eastern states which range in length from 3 to 8 mm. No key to these smaller eastern forms has been published except a partial one by Abbott (1913, 87) to the species known from Georgia and a brief one covering six species in the Hemiptera of Connecticut. These are based largely upon the number of paler pegs present, and are of little value. The following key is for a part of the species only. Brief descriptions of those not in the key which have apparently been rightfully recorded or are definitely known from our territory are therefore given in alphabetical order,¹⁰⁰ as listed by Van Duzee in his Catalogue. A number of these are doubtless synonyms, but from lack of specimens I cannot determine which.

PARTIAL KEY TO EASTERN SPECIES OF GROUP II, ARCTOCORIXA.

- a. Elytra with disks of clavus, corium and membrane dark brown or black, without lineations, their narrow margins yellow; length, 6—6.5 m. 1221. *HYDATOTREPES*.
- aa. Elytra with more or less evident cross lineations of pale and dark.
 - b. Dark pronotal cross-lines fewer than seven in number; length less than 5 mm.
 - c. Dark cross-bars of pronotum distinctly wider than the pale ones.
 - d. Larger, length 4.7 mm. 1222. *SERIATA*.
 - dd. Smaller, length 3—3.5 mm. 1223. *BRADLEYI*.
 - cc. Dark and pale cross-lines of pronotum of equal width; length, 3—3.2 mm. 1224. *ABJECTA*.
 - bb. Dark pronotal cross-lines seven or more in number.
 - e. Inner basal third of clavus with a large oblique pale space devoid of black markings; dark cross-lines of pronotum 10—12; length, 7.7—8 mm. 1225. *EDULIS*.

¹⁰⁰In addition to the smaller species of *Arctocorixa* below described, the following have been mentioned or recorded from eastern North America, but they are not included for the reasons given; *A. abdominalis* (Say), a Mexican species, recorded by Banks from Florida, but no citation or other record; *A. expleta* (Uhl.), a Colorado species recorded from New Jersey by Smith (1910), probably on a wrong identification; *A. kirbyi* (Fieb.)=(*A. carinata* Kirby), recorded from "Canada," but mentioned by Kirkaldy and Bueno (1909) as "doubtfully American"; *A. stigmata* (Fieb.), recorded from "North America," also mentioned by the same authors as "doubtfully American"; *A. tarsalis* and *A. zimmermannii*, both described by Fieber only from females, the former from Pennsylvania, the latter from Pennsylvania and "Carolina," and neither since recognized.

- ee.* Inner basal third of clavus without an immaculate pale area, or, if present, the pronotal cross-lines and length not as in *e.*
- f.* Pale and dark cross-lines of clavus entire (or slightly forked) in distinct contrast with the confused and broken ones of corium; length, 6—7.8 mm.
- g.* Pale markings of corium coalescent to form three longitudinal stripes with edges almost entire. 1226. *TRILINEATA.*
- gg.* Pale markings of corium confused, much interrupted, not arranged in unbroken stripes.
- h.* General color dark fuscous-brown on a yellowish background; entire upper surface strongly rastrate; male pala and pegs as in pl. XII, fig. 11. 1227. *ALTERNATA.*
- hh.* General color umber or brownish-yellow on a cream or ochreous background; male pala and pegs as in pl. XII, fig. 12. 1228. *PARSHLEYI.*
- ff.* Pale cross-lines of clavus, except at base, much interrupted and of the same character as those of corium; length (except in *vulnerata*) less than 6 mm.
- i.* Pale markings of corium short, narrow, vermiculate, arranged in three quite definite longitudinal rows; ground color blackish-fuscous; dark pronotal cross-lines 6—7, wider than pale ones; vertex and front half of pronotum carinate. 1229. *SIGNATA.*
- ii.* Pale markings of corium not arranged in definite rows; ground color rarely blackish-fuscous; dark pronotal cross-lines 7—9. 1230—1242. *SPECIES A—Z.*

1221 (1435). *ARCTOCORIXA HYDATOTREPHES* Kirkaldy, 1908, 119.

Oblong, slender, parallel. Vertex of male dark brown; lower front of head and legs pale yellow; pronotum either wholly blackish or with 3—5 very narrow pale cross-lines; elytra as in key, claval sutures, edges of commissure and outer edge of corium, yellow; embolium fuscous; under surface in great part brown, the margins of sterna and basal halves of ventrals paler. Vertex of head less than one-third the width of pronotum, marked by two rows of coarse punctures. Pronotum short, subpentagonal, hind margins rounded, both it and elytra minutely rastrate. Male with front of head without evident impression; pala short, broad, arched, with about 18 pegs parallel to the arched curved dorsal margin. Female with head wholly pale and palæ more elongate, less arched. Length, 6—6.5 mm.

Raleigh and Windsor, N. Car., April 12—Oct. 21 (*Brimley*). Recorded elsewhere only from Spring Creek, Decatur Co., Ga., where Bradley found it common in June in heavily shaded cypress-bordered pools. Easily known by the solid dark brown, pale bordered divisions of the elytra.

1222 (1447½). *ARCTOCORIXA SERIATA* Abbott, 1916, 342.

Dark brown; head yellow; pronotum with five pale cross-lines; claval lineations mostly entire; those of corium and membrane much broken and indefinitely seriate. Pronotum and clavus very rastrate. Male with

frontal impression deep, extending past middle of eyes; pala as in fig. 13; pegs 17, in an angulated row. Length, 4.7 mm.

Recorded from numerous stations in New England; not known elsewhere.

1223 (—). *ARCTOCORIXA BRADLEYI* Abbott, 1915, 84.

Yellowish-gray to brown; pronotum rastrate, with 5—6 dark brown parallel bars, these twice or more the width of the alternate yellow lines; elytra dark brown, minutely rastrate, lines of clavus broad, much confused and coalescent; those of corium much inosculate, and interrupted to form two or three longitudinal series; those of membrane partially effaced; lower surface and front and middle legs sordid white; hind legs brown. Male with head short, broad, frontal impression broad, shallow, reaching middle of eyes; pala oblong, cultrate, with 16—18 pegs in an even median curved row. Length, 3—3.5 mm.

Described from Billy's Island and other points in Georgia. Known only from that State.

1224 (—). *ARCTOCORIXA ABJECTA* sp. nov.

Chocolate-brown with yellow markings. Head, legs and under surface pale yellow; eyes blackish-brown; pronotum with five narrow pale cross-lines of the same width as the brown ones, the second and third often united near the margin; clavus with the pale lines on inner half of basal third oblique and entire, elsewhere interrupted, forming short undulate lines; pale markings of corium and membrane everywhere broken into short sinuous oblique marks, these arranged in four evident but irregular longitudinal rows, the inner and outer ones adjacent to the claval suture and costal margin; apex of corium with a pale triangular area opposite middle of membrane; embolium dull yellow, its outer edge and that of corium blackish; hind tarsi fuscous. Vertex relatively narrow with sides parallel, its width about two-thirds that of basal width of eye, its basal half carinate and with two irregular rows of punctures. Pronotum distinctly rastrate, two-thirds wider at middle than long, its apical third carinate. Clavus and corium almost smooth. Male with frontal impression narrow, oval, reaching apical third of eyes; pala broad, cultrate, pegs about 20, the row median at base, thence gradually curving upward and following the dorsal margin. Female with vertex slightly wider; front convex and with an obtuse median carina. Length, 3—3.2 mm.

Very common in the ponds and ditches about Dunedin, Fla., Nov. 18—April 23. Evidently allied to *bradleyi*, but the alternate pale and dark pronotal lines of equal width and the row of pegs median only at base.

1225 (1428). *ARCTOCORIXA EDULIS* Champion, 1901, 380.

Elongate, smooth, shining, yellowish-testaceous; pronotum with 10—12 very slender transverse black lines; those on apical half in part abbreviated; clavus, except for an oblique space at base, corium and mem-

brane closely marked with short, transverse undulate, irregular black lines, these so arranged as to form four irregular series on each elytron; embolium pale with apex and a transverse mark behind middle infuscate; legs and under surface pale. Vertex with a short carina at base. Elytra finely rastrate. Male with frontal impression large, broad, oval; pala spoon-shaped, produced and somewhat pointed at tip; ventral segments asymmetrical on the left side; strigil on the right. Length, 7.7—8 mm.

Agricultural College, Miss. (*Wced*). Described from Mexico; recorded by Van Duzee (1917, 480) from the "Southern States," and by Hungerford (1925a, 142) from Kansas, Minnesota and the East. It appears to be aberrant as to genus, the smooth surface and sinistral asymmetry of male suggesting *Corixa*.

1226 (1455). ARCTOCORIXA TRILINEATA Provancher, 1872, 108.

"Brown. Face yellow with a median line on vertex and front; eyes black. Prothorax with 8—9 transverse lines. Antennæ yellow and brown; elytra brown with numerous yellow transverse striæ on the triangular part of the scutellum (clavus); remainder of corium with three longitudinal yellow stripes almost without indentations, these replaced on the triangular disk of membrane by yellow zigzag marks and lines. Under surface clear yellow with a brown spot at base of abdomen; tarsi also brown. Length, 6.2 mm." (*Provancher*).

Described from Quebec, where, says Provancher: "It occurs in company with *bilineata* in all the waters about the environs of the city." Recorded from numerous stations in New England. Pala of male as in pl. XII, fig. 14.

1227 (1422). ARCTOCORIXA ALTERNATA (Say), 1825, 329; II, 251.

Elongate, subparallel, strongly rastrate. General color brown with yellow markings; pronotum with eight or nine narrow, nearly uniform dark brown or blackish transverse lines; clavus with the dark cross-bars relatively broad, parallel, entire, in part forked, nearly uniform throughout; corium with short zigzag undulate pale cross-lines, these interrupted to leave a narrow dark stripe each side of disk; membrane with the yellow lines broken into very irregular zigzag flecks and marks; embolium yellow with margins dusky, more widely so near base; under surface in great part blackish; sides of sterna, last three ventrals and side margins of the others yellow. Male with frontal impression very large, reaching middle of eyes, its sides subparallel; hind margin of pronotum broadly rounded; pala as in pl. XII, fig. 11; pegs 38—40 in a single curving row. Female with front convex and apex of hind margin of pronotum obtusely angled. Length, 6—8 mm. (Fig. 215, a).

Common throughout northern Indiana, less so in the southern counties. Occurs mainly in woodland ponds and stagnant pools of streams in which the bottom is covered with small sticks and other vegetable debris. Raleigh, N. Car., Sept. 8

(*Brimley*). Staten Island, N. Y., Oct. 5 (*Davis*). Its recorded range extends from New England west to Illinois and southwest to Missouri. Van Duzee includes Florida and cites a Barber reference which is incorrect. The entire, subparallel, pale and dark cross-bars of clavus, strongly rastrate upper surface and numerous pegs of male pala distinguish this from its allies.

1228 (1444½). *ARCTOCORIXA PARSHLEYI* Abbott, 1916, 342.

Color as in key; pronotum with eight or nine pale cross-lines; pale lineations of clavus broad and entire; those of corium confused and interrupted, not longitudinally seriate. Male pala as in fig. 12, the pegs 29—30, placed along the upper margin. Strigil square, small, with six cross striæ. Length, 6.5 mm.

Pittsburgh and Greensburg, Pa. (*Wirtner*). Recorded from Maine, Rhode Island and New York. Closely allied to *alternata* (Say).

1229 (1449). *ARCTOCORIXA SIGNATA* (Fieber), 1851a, 21.

Dark fuscous brown; eyes black; pronotum with six or seven blackish cross-bars with much narrower yellow lines alternating; basal third of clavus with regular oblique dark bars and pale lines; remainder of clavus and corium with short zigzag yellow marks arranged in three somewhat regular longitudinal rows; pale marks of membrane obscure; head, legs and sterna dull yellow; embolium, setæ of hind tibiæ and fringe of hind tarsi, fuscous; ventrals dusky. Vertex of head with a short median carina. Pronotum lenticular, its hind margin obtusely rather broadly rounded; disk strongly rastrate, the apical third with a short obtuse median carina. Clavus and corium much more finely rastrate. Male with frontal impression narrow, reaching middle of eyes; pala short, cultrate, less than twice as long as wide, about one-fourth longer than the narrower tibia; pegs 13, in a regular row. Length, 5—5.5 mm.

Marshall Co., Ind., Aug. 15. Dunedin and R. P. Park, Fla., Nov. 18—April 18 (*W. S. B.*). Scarce in Indiana; common throughout the winter in ponds near Dunedin; not before reported from Florida. Lakehurst, N. J., and Staten Island, N. Y. (*Davis*). Recorded from Pennsylvania, Illinois and Georgia. The fuscous-brown hue, rows of pale zigzag markings and carina on vertex of head and front of pronotum are the chief distinguishing characters.

* * *

1230 (1423). *ARCTOCORIXA BILINEATA* (Provancher), 1872, 108.

"Face pale yellow, with a brown line on vertex and front; eyes dark brown. Pronotum with five or six transverse yellow lines, alternating with brown ones. Elytra brown; clavus bordered with yellow and with

numerous small transverse lines not reaching the median suture; remainder of corium with two longitudinal more or less undulated yellow lines; membrane with numerous yellow marks. Sterna, ventrals and legs pale yellow; hind femora with a small brown annulus near apex. Length, 4.5 mm." (*Provancher*).

Described from Quebec and recorded only from there.

1231 (1424). *ARCTOCORIXA CALVA* (Say), 1832, 38; I, 366.

"Body above, glabrous, polished. Pale yellowish; head yellow; pronotum with eight or nine transverse black lines; elytra with numerous undulated or angulated black transverse lines which are more or less bifid and inosculated; those of the anterior inner portion not larger than the others; lateral grooves and all beneath yellowish-white. Length less than one-fifth of an inch. Inhabits United States. Quite distinct from the *interrupta* and *alternata* nob., which are both minutely rugulose." (*Say*).

The above is the original description. Fieber (1851a, 19) evidently described a different insect under Say's name, as he mentions a fuscous species with hemelytra "*longe-pilosa*." The species has been recorded from Ontario, New England, Pennsylvania, Colorado, Texas and Alaska. Judging from the original description it very probably belongs to the genus *Corixa*.

1232 (—). *ARCTOCORIXA COMPRESSA* Abbott, 1915, 81.

Dark brown; head sordid yellow; pronotum with 7—8 very broad, parallel cross bars, each nearly twice as wide as the alternate yellow ones; claval lineations broad, confused, confluent; those of corium vermiculate in two or three indefinite longitudinal rows; embolium fuscous; hind portion of membrane bordered with brown; under surface and legs sordid to brown. Pronotum strongly rastrate, keeled in front, obtusely rounded behind. Clavus minutely rastrate, corium smooth. Male with front flat; pala as in pl. XII, fig. 15, compressed, bent in the middle as if pinched; pegs 20—21 in an even curving median row. Length, 4.7—5.2 mm.

Recorded from Connecticut and various stations in Georgia.

1233 (1429). *ARCTOCORIXA ERICHSONII* Fieber, 1851a, 35.

Blackish fuscous; pronotum with nine or ten transverse curved pale lines, its margins fuscous; clavus with pale lines parallel, oblique, entire; corium with lines subparallel, longitudinally interrupted, approximate, some of them forked, its inner apical angle with a black stripe; marginal line of costal area yellowish, finely denticulate; membrane rhomboidal, its suture yellow, margins black, its pale lines oblique, confluent; legs pale; dorsum black, male, its sides pale, female; middle of mesosternum fuscous; male with five ventrals black; female with two. Male with pala cultrate, its base beneath produced; frontal impression obovate, reaching middle of eyes. Length, 5.5 mm.

Described from Pennsylvania. Not recorded elsewhere.

1234 (1463). *ARCTOCORIXA GORDITA* (Abbott), 1913, 84.

Short, plump, with short broad head; pronotum and clavus rastrate. Tawny yellow with dark brown markings; head brownish-yellow, its hind margin fuscous; pronotum lenticular, with seven parallel dark brown cross-bars; clavus with cross-lines oblique, entire; lineations of corium very dark, irregular, confused, coalescent to form a large irregular blotch near inner apical angle; membrane with markings irregular, vermiculate, a dark spot on lower outer edge; under surface dusky; legs yellow, hind tarsi brown. Male with frontal impression shallow, ovate, reaching eyes, its middle with a convexity or callus; pala as in fig. 215, *k*, nearly four times as long as wide at base; pegs 22, in an almost straight line near lower margin. Length, 4—4.5 mm.

Described from several stations in Georgia; not recorded elsewhere.

1235 (1441). *ARCTOCORIXA LATERALIS* Leach, 1817, 17.

Cinereous or yellowish-gray; pronotum with 7—9 narrow curved black lines; inner basal angles of clavus without lines, remainder with narrow, crowded, blackish, irregular confluent ones; corium with dark lines crowded, broken, angulated, forming on the disk, by their points of contact, three longitudinal dark streaks; membrane with front margin brown, the others pale, its disk with fine, irregular black reticulations, these radiating and parallel from along the margins; legs pale, basal joint of hind tarsi blackish; dorsum black, embolium pale. Male with frontal impression elliptical, reaching slightly above the lower angles of eyes; pala broad, cultrate, its apex rounded; ventrals 1—4 black, remainder yellowish. Length, 4.7—5.3 mm.

A widely distributed European species, known in this country only from Pennsylvania. The *A. hieroglyphica* (Duf.) is a synonym.

1236 (1442). *ARCTOCORIXA LINEATA* (Forster), 1771, 70.

"Pale yellow; elytra concolorous and with three longitudinal fuscous stripes; head yellow, obtuse; eyes brown; thorax yellow with three transverse fuscous lines; inner wings whitish, pellucid; abdomen, legs and pectus pale yellow. Length, 4.2 mm." (*Forster*).

Described from "North America." Recorded from New York.

1237 (1443½). *ARCTOCORIXA MODESTA* Abbott, 1916, 343.

Tawny yellow with brown lines; pronotum subtriangular with nine unbroken brown cross-lines; clavus with narrow yellow margin, the brown lines broken, forked and confluent; corial lineations inosculate, tending to coalesce in a stripe along the margin, those of membrane uniting to form a central spot. Pronotum, clavus and basal half of corium strongly rastrate. Male with frontal impression elliptical, reaching middle of eye; pala cultrate, slightly produced at base, somewhat incurved; pegs 33 in a single row. Length, 5 mm.

Described from Maryland, Virginia and District of Columbia. Not recorded elsewhere.

1238 (1445). *ARCTOCORIXA PECTENATA* Abbott, 1913, 83.

Olivaceous; head dull yellow; pronotum subcordate with seven parallel straight yellowish lines; lineations of clavus entire, those of corium coalescent to form a vitta on the inner angle; those of membrane confused, uniting in a central fleck and a darker spot on outer border; legs pale, hind tarsi brown; thoracic pleura pale, abdomen dark. Male with frontal impression shallow, long and narrow; pala lanceolate, strongly compressed, deeply excavated on outer surface; pegs 24 in an irregular row along lower margin, the basal seven small. Length, 4.5 mm.

Described from Marietta, Ga.; not recorded elsewhere.

1239 (—). *ARCTOCORIXA SCABRA* Abbott, 1915, 83.

Tawny yellow with broad brown markings; head yellow; pronotum with seven brown cross-lines, these about as wide as the yellow ones; clavus coarsely rastrate, its brown bars entire, subequal in width to pale ones; corium very finely rastrate, its inner hind angle pale, brown markings broad, confluent, vermiculate, indefinitely longitudinally seriate. Male with frontal impression pear-shaped, reaching above front of eyes; pala as in pl. XII, fig. 17; pegs 22—24 in an evenly curving, nearly median row. Length, 4.7—5 mm.

Ranges from New England southwest to Georgia.

1240 (—). *ARCTOCORIXA SIGMOIDEA* Abbott, 1915, 82.

Closely allied to *compressa* but smaller, more slender and paler, with finer rastration which covers the whole surface of elytra. Pronotum with six dark umber parallel bands, the fourth and fifth not reaching the margins, these three to four times the width of the yellow cross-lines. Elytra with brown markings variable, broad, confluent, vermiculate, more or less triseriate, the yellowish ones reduced to broken dots and dashes; hind portion of membrane widely bordered with dark brown; under surface and legs dirty white; hind tarsi brown. Male with frontal impression oblong-oval, slightly surpassing base of eyes; pala flattened and warped as in *compressa*, almost hemispherical in outline, the tip produced in a nose-like projection with a terminal spine; the 13 or 14 pegs of basal half short, blunt, crowded and arranged in an S-shaped curve; the 6 or 7 on apical half more slender and widely spaced, following the upper contour of the pala. Length, 4—4.5 mm.

“The most abundant species in southern Georgia, the males easily identified by the peculiar palæ, the females difficult to discriminate from those of *compressa*.” (*Abbott*). Known only from that State.

1241 (1450). *ARCTOCORIXA STAGNALIS* (Leach), 1817, 16.

Blackish-fuscous; pronotum with eight transverse yellow lines, these sometimes abbreviated or forked; lineations of clavus entire, parallel,

the yellow ones sometimes forked; corium sparsely pilose and with unequal, crowded, undulate pale marking, its inner angle and costal area with a blackish stripe; membrane with sutural line narrow, dentate, its disk with sparse flexuous lines; dorsum, sterna and xyphus black; four basal ventrals black in male, two in female. Male with frontal impression obovate, equalling eyes; pala short, wide, cultrate, its dorsal margin curved, base beneath produced in an obtuse angle. Length, 5 mm.

A palæarctic European species recorded by Fieber (1851a, 35) from Pennsylvania, under the name *Corisa limitata* Fieb., a synonym.

1242 (1457). ARCTOCORIXA VULNERATA (Uhler), 1861, 284.

Blackish-fuscous; upper surface uniformly rastrate; pronotum yellow with seven black lines, two of them forked; clavus with yellow lines on base entire, those behind middle interrupted at inner suture, middle ones broken; lines of corium broken, subparallel, the oblique one at membrane yellow; membrane with very serpentine lines, radiating toward but not reaching inner margin; marginal area yellowish-white; ventrals dusky at base; dorsum black; connexivum yellow, its incisures black; legs yellowish-white, tarsi in part black. Pala cultriform, slightly curved at tip, its middle hardly broader. Length, 7.5 mm.

Described from the State of Washington and recorded by Uhler (1876, 341) from Montana, Oregon and northern Illinois. "Remarkable for having very fine scratched transverse lines bounding some of the lines of thorax." (Uhler).

V. HESPEROCORIXA Kirkaldy, 1908, 118.

This genus, as characterized in the generic key, p. 1065, is represented by a single known species.

1243 (1460). HESPEROCORIXA BRIMLEYI Kirkaldy, 1908, 120.

Elongate-oblong, robust. Above shining reddish-brown, basal fourth of clavus and a large spot near apex of corium blackish-brown; head wholly, or in part, front legs and middle femora pale greenish-yellow; middle tibiæ and hind legs dull yellow with a strong reddish tinge; under surface brown, the genitals and narrow side margins of ventrals yellowish. Pronotum lenticular, three times as wide as long, very minutely strigose, its hind margin broadly rounded. Elytra with sides parallel to apical fourth, then tapering to the narrowly rounded tips. Male with frontal depression very faint; palæ cultrate with about 28 pegs; strigil rather large, oblong-oval. Length, 8.5—9.5 mm.

Raleigh and Wendell, N. Car., March 26—April 12 (*Brimley*). Described from Raleigh and not recorded elsewhere. Easily known from all other Corixids by its smooth polished upper surface devoid of cross-lineations and the peculiar coloration.

VI. PALMACORIXA Abbott, 1912, 337; 1913, 113.

Elongate, elytra tapering posteriorly, with vermiculate, often semi-obsolete markings; inner wings aborted in both sexes; males with vertex convex, face flat; palæ thin, plate-like, upper margin parabolic; front femur with a large stridular area; asymmetry and strigil dextral; fifth tergite entire, sixth divided. Two species are known, both occurring in our territory.

KEY TO SPECIES OF PALMACORIXA.

- a.* Clavus devoid of lineations on a large area near inner basal angle; pala of male with two short rows of pegs on the lower basal third (fig. 215, *j*); front femur of female trapezoidal, two-thirds as wide as long. 1244. GILLETTII.
- aa.* Lineations of clavus covering the entire surface; pala with a single irregular row of 24—33 pegs along the middle of the sides (fig. 19); front femur of female oblong, two and a half times as long as wide. 1245. BUENOI.

1244 (1461). PALMACORIXA GILLETTII Abbott, 1912, 337.

Pale yellowish with brown markings; head pale yellow; pronotum minutely rastrate, yellowish, paler at sides, with eight to ten narrow, broken, confluent dark cross-lines, some of the hind ones joining the marginal line; clavus with inner basal portion yellow, outer margin with a diagonal stripe along the corial suture, the intervening area with numerous, variable, irregular dark markings; corium and membrane with vermiculate and inosculate brown markings, usually arranged in two rather indefinite longitudinal stripes; embolium yellow; legs and under surface yellowish-white. Male pala as in fig. 215, *j*, strongly compressed, lower edge straight, upper one parabolic, surface covered with fine depressed spines; pegs in two rows, upper row with five or six, lower one with nine or ten; tibia globular, one-fourth the length of pala; femur oblong, as long as pala. Length, 6 mm.

Described from Colorado. Recorded by Hussey from Three Oaks, Mich. He states that superficially it bears a strong resemblance to *Corixa verticalis* Fieb.

1245 (1462). PALMACORIXA BUENOI Abbott, 1913a, 113.

Oblong, subparallel. Above dull yellow to smoky brown, much darker than *gillettii*, the lineations fuscous-brown; pronotum with seven or eight narrow, more or less broken dark cross-bars alternating with yellow ones; claval lineations narrow, vermiculate, fused along the outer margin to form an irregular dark line parallel to the suture; pale zig-zag marks of corium in somewhat regular longitudinal rows; front of head, embolium, legs and under surface pale straw-yellow. Pronotum and clavus rastrate; corium finely punctate. Male palæ cultrate, three times as long as wide, the pegs in a very irregular row (pl. XII, fig. 19). Length, 4.5—6 mm. (Fig. 215, *i*).

McCullers, N. Car., Sept. 10 (*Brimley*). Ranges from Massachusetts and New York west to Michigan and southwest to North Carolina, Georgia and Kansas. Abbott calls it "a delicately marked and very variable species."

VII. CORIXA Geoffroy, 1762, 477.

Species resembling very closely those of *Arctocorixa* in form and color, but always more shining and not at all or very faintly rastrate; head somewhat broader with hind angles more prolonged. Males with front tibia prolonged above the basal fourth or more of pala in the form of a triangular spur or rounded lobe (pl. XII, fig. 18; fig. 215, *l*), and asymmetry and strigil of ventrals sinistral or on the left side. Eight species are known from North America, six of which occur in the eastern states.¹⁰⁷

KEY TO EASTERN SPECIES OF CORIXA.

- a. Dark pronotal lineations not more than 10.
 - b. Length, 5 or 6 mm.; dark pronotal cross-lines 8—10.
 - c. General color yellow with fuscous markings; head yellow, vertex fuscous; pale cross-lines of pronotum all regular, as wide or slightly wider than the dark ones; form more robust; pala and pegs of male as in pl. XII, fig. 18. 1246. VERTICALIS.
 - cc. General color blackish-fuscous; head wholly fuscous; pale cross-lines of pronotum narrower than dark ones; form more slender; pala of male with upper edge regularly curved, not angulate as in *verticalis*, pegs 18 in a straight oblique row. 1247. RETICULATA.
 - bb. Length less than 4 mm.; dark pronotal cross-lines not more than six.
 - d. Pronotum with but three dark cross-bars; pale markings of corium forming three evident but ill-defined longitudinal rows; pala and pegs of male as in fig. 215, *l*. 1248. MACROCEPS.
 - dd. Pronotum with five or six dark cross-bars; pale markings of corium not arranged in rows.
 - e. Clavus with dark bars crossing the entire disk; vertex without fuscous stripes; pronotum finely rastrate, with pale cross-lines very narrow, broken or confused. 1249. MINIMA.
 - ee. Clavus with an oblique area on inner basal third devoid of dark marks; vertex with three fuscous stripes; pronotum almost smooth, the pale cross-lines regular and as wide as dark ones. 1250. PULCHRA.
 - aa. Pronotal lineations 12; tegmina dark and dull; males unknown; length, 5 mm. 1251. SELLARIS.

¹⁰⁷The *C. burmeisteri* Fieber from "America boreali" is not included in the key, but a translation of the original description is appended.

1246 (1467). *CORIXA VERTICALIS* Fieber, 1851a, 24.

Elongate, sides subparallel. Above pale yellow, shining; pronotum with nine or ten narrow transverse black lines, alternating with similar yellow ones; black markings of clavus narrow, oblique, in part anastomosing, often forked on the ends; those of corium and membrane similar but less oblique; lower front of head and under surface dull white, immaculate. Male with frontal depression very large, covering nearly the entire face and projecting above the eyes; pala as in fig. 18, scarcely longer but distinctly broader than tibia, its apical half deflexed, obliquely truncate, pegs as in key. Female with head darker, its front convex. Vertex obtusely longitudinally carinate in both sexes. Other characters as in key. Length, 5—6 mm.

Marion Co., Ind., Aug. 16—Oct. 7 (*W. S. B.*). Agricultural College, Miss. (*Wcd*). In Marion County it occurs frequently among the clumps of water-willows, *Dianthera americana* L., close to the edge of running water; also in the stagnant waters of woodland ponds. Recorded definitely heretofore only from New England, Pennsylvania, Michigan and Georgia. Easily known from our other species by its larger, more robust form and the very large frontal depression of males, the apex of which projects above the eyes.

1247 (1447). *CORIXA RETICULATA* Guerin, 1857, 423.

Elongate, slender, sides subparallel. Color as in key; cross-lines of pronotum crowded, the nine or ten pale ones sordid white, with two or three of the median ones united near the ends; clavus with basal eight or ten dark lines regular, parallel, narrower than the pale intervals, slightly widened and in part forked at the ends; apical two-thirds of clavus and all of corium and membrane with short vermicular or undulate pale markings, evenly distributed; embolium yellowish, its outer margin fuscous; legs and under surface wholly pale. Vertex as wide as eyes with a row of fine punctures each side, and an obtuse median carina prolonged backward as a cusp. Pronotum convex, triangular, minutely rastrate, its hind margin obtuse-angled. Male with frontal impression deep, elliptical, reaching between apical third of eyes; pala as in key, tibiae prolonged over its basal third. Female with front strongly convex, hind tarsi fuscous. Length, 4.5—5 mm.

Dunedin and R. P. Park, Fla., Nov. 18—March 26. Frequent in the ponds about Dunedin; taken at the Park at light and from a limestone roadside ditch. Described from Cuba. Recorded by Barber from Charlotte Harbor, Ft. Myers, Punta Gorda, Biscayne Bay and Titusville, Fla.

1248 (1465). *CORIXA MACROCEPS* Kirkaldy, 1908, 119.

Oblong, slightly wider behind the middle. Pronotum and elytra dull brownish-yellow, the former with three rather broad entire, transverse

brown cross-bars; clavus with dark cross lines distinct near base, elsewhere very irregular; dark markings of corium arranged in three vague irregular longitudinal rows; head, under surface and legs pale dull yellow. Pronotum and clavus minutely rastrate, corium smooth, shining. Male pala short, cultrate, twice as long as wide, the basal two-fifths covered by the tibial spur. Length, 3.3 mm.

Lakehurst, N. J., May 29 (*Davis*); one specimen labelled "*Trichocorixa micronectoides* Plunkett." Described from Raleigh, N. Car. Recorded elsewhere only from Oglethorpe, Ga.

1249 (1466). *CORIXA MINIMA* Abbott, 1913, 86.

Dull yellow with brown markings; eyes silvery gray; pronotum finely rastrate, narrower than head, rounded behind, twice as wide as long, with five or six blackish, confused cross-bars; pale lineations of clavus, except at base, inosculate, confused; those of corium vermiculate, united along the margins, not broken to form series; membrane with markings effaced; embolium sordid or dusky; legs and under surface pale. Male with frontal impression oblong, occupying all the face; vertex carinate; tibiae produced over pala for one-third its length; pala short, cultrate; pegs 12 in a straight row. Female paler than male with five unbroken pronotal lineations. Length, 3.3 mm.

Natick, Mass., Aug. 30 (*Frost*). Described from Georgia and recorded only from that State.

1250 (—). *CORIXA PULCHRA* sp. nov.

Oblong, slender, sides subparallel. Head yellow, vertex with three fuscous lines; pronotum with five parallel yellow cross-lines, the median one sometimes partially united with the second; clavus with an oblique pale area as in key, the dark bars on outer side of this oblique, parallel, more or less broken, wider than the pale ones; corium and apical portion of clavus with pale marks vermiculate and much broken, those on membrane longer and subparallel, less broken but very sinuous or undulate; embolium, hind tarsi and a streak on tibiae fuscous. Vertex with sides subparallel, its base about three-fifths that of basal width of an eye, disk with a median carina. Pronotum subtriangular, two-thirds wider at middle than long, male, twice as wide, female, hind margin obtusely angled, disk minutely almost invisibly rastrate. Elytra smooth. Male with frontal impression deep, subelliptical, its sides parallel, reaching between apical fourth of eyes; tibiae distinctly projecting over pala, the latter scarcely twice as long as high at middle, upper margin arched, its front strongly deflexed, pegs about 16 in an oblique median row. Female with front convex, dark median carina of vertex reaching below eyes; pala shaped as in male. Length, 3.5—3.8 mm.

Dunedin, R. P. Park and Palmdale, Fla., Nov. 20—April 17; common in ditches and ponds about Dunedin; also taken from between the culms and leaves of sedges; frequent in ditches

at the Park. A handsome, well marked little species, and the only *Corixa* with pale basal claval area as in *A. edulis* (Champ.) and *A. mercenaria* (Say).

1251 (1464). *CORIXA SELLARIS* Abbott, 1913, 85.

Elongate, slender; pronotum and clavus minutely rastrate. Head yellowish-white, vertex fuscous; pronotum triangular, with 12 dark brown lines, these curved, parallel, almost entire; elytral markings everywhere vermiculate and anastomosing, forming a continuous interlocking pattern over clavus, corium and membrane, with little tendency toward cross-barring or arrangement in rows; embolium fuscous; legs and under surface ivory-white. Female with pala compressed, broadly joined to tibia, two-fifths as wide as long. Length, 5 mm.

Known only from females taken at several stations in Georgia.

1252 (1469). *CORIXA BURMEISTERI* Fieber, 1851a, 24.

"Blackish-fuscous with yellow lines; head yellow, vertex acutely angulated; pronotum short, posteriorly rectangular, with margins and seven or eight straight cross-lines fuscous; elytra narrow with pale lines wide, unequal, forked, crossing over onto membrane, where they are horizontal and acutely angulate or undulate; embolium sordid, with several lines or a spot toward apex blackish; legs and under surface pale. Male with frontal impression obovate, scarcely surpassing eyes; pala obliquely ovate, acute, base beneath produced in an angle. Length, 4 mm." (*Fieber*).

The above is a free translation of the original description, the types being from "America boreali."

* * *

1253 (1440). *ARCTOCORIXA LÆVIGATA* (Uhler), 1893a, 384.

Chestnut-brown. Pronotum very convex, highly polished, not rastrate, its disk with a percurrent median carina and crossed by 14—15 yellow lines, these sometimes split at or before the middle, the basal ones narrower. Yellow cross-lines of clavus interrupted, the inner series zigzag; those of corium in short, wavy, subdiagonal rows. Male with frontal impression ovate, very shallow, reaching slightly above the line of eyes; pala broad, cultrate, apex above bluntly rounded, lower apical angle subacute. Length, 10—11.5 mm.

Described from Utah and California. Recorded by Hungerford (1925a, 142) from Rhode Island, New Jersey and Maryland. The non-rastrate carinate pronotum with 14—15 pale cross-lines will distinguish this species from the other members of its group.

LOCAL DISTRIBUTION OF EASTERN HETEROPTERA.

As mentioned on page 4, the Heteroptera of Florida are much better known than those of Indiana. In order to show the comparative distribution by families in the two states, the accompanying table has been prepared. From it it will be noted that of the 1,253 species described in this work, 414 have been recorded from Indiana and 548 from Florida. Of those from the latter State 209 are neotropical forms, most of which are known in this country only from Florida, or from Florida and the southwestern states, but not elsewhere recorded from east of the Mississippi. Of the 478 eastern species included, but not yet recorded from either Indiana or Florida, 258 or 54 per cent are Miridæ, showing that there is much work yet to be done on that family in both states.

DISTRIBUTION TABLE OF EASTERN HETEROPTERA.

No. of Family.	FAMILY.	Recorded from Indiana.	Recorded from Florida.	Common to both States.	From Florida Alone.	Other States Only.	Total.
I.	Scutelleridæ	4	9	1	4	3	15
II.	Podopidæ	2	3	.....	1	.....	5
III.	Corimelænidæ	8	5	5	.....	5	13
IV.	Cydnidæ	9	14	6	4	2	19
V.	Pentatomidæ	42	64	25	27	16	97
VI.	Coreidæ	11	34	9	16	2	38
VII.	Coriscidæ	6	7	3	2	1	11
VIII.	Corizidæ	6	10	4	4	4	16
IX.	Aradidæ	17	24	7	7	20	54
X.	Neididæ	3	3	2	1	.....	4
XI.	Lygæidæ	47	74	25	35	24	120
XII.	Pyrrhocoridæ	.....	7	.....	3	2	9
XIII.	Thaumastocoridæ	.....	1	.....	1	.....	1
XIV.	Piesmidæ	1	1	1	.....	.....	1
XV.	Tingididæ	20	23	4	13	34	73
XVI.	Enicocephalidæ	1	1	1	.....	.....	1
XVII.	Phymatidæ	3	7	3	2	2	9
XVIII.	Ploiariidæ	4	18	3	11	7	26
XIX.	Reduviidæ	23	38	17	4	5	49
XX.	Nabidæ	8	9	2	3	5	20
XXI.	Næogeidæ	3	6	2	3	.....	7
XXII.	Mesoveliidæ	1	2	1	1	2	4
XXIII.	Cimicidæ	1	1	1	.....	2	3
XXIV.	Anthocoridæ	6	16	4	6	11	29
XXV.	Cryptostemmatidæ	.....	3	.....	2	2	5
XXVI.	Isometopidæ	.....	.....	.....	.....	4	4
XXVII.	Microphysidæ	.....	.....	.....	.....	1	1
XXVIII.	Termtaphylidæ	.....	.....	.....	.....	1	1
XXIX.	Miridæ	136	109	36	46	258	467
XXX.	Hydrometridæ	1	2	1	.....	.....	2
XXXI.	Gerridæ	9	6	2	1	6	19
XXXII.	Veliidæ	5	9	1	2	3	16
XXXIII.	Saldidæ	11	8	4	2	7	22
XXXIV.	Ochteridæ	1	2	.....	1	.....	3
XXXV.	Nerthridæ	1	5	1	2	1	6
XXXVI.	Naucoridæ	1	2	1	.....	.....	2
XXXVII.	Nepidæ	4	6	3	.....	.....	7
XXXVIII.	Belostomatidæ	5	6	5	.....	1	7
XXXIX.	Notonectidæ	7	8	6	1	7	16
XL.	Coreidæ	7	5	1	4	39	50
	Total	414	548	187	209	478	1253

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ERRATA.

Page 369. The number before LEUCOPTERUS in key should be 313.

Page 402. The serial number of O. BILOBATA should be 346.

Pages 450—468. CORYTHUCA should be CORYTHUCHA.

Page 607. NÆOGUS in first line below key should be NÆOGEUS.

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